

Evolution in Four Dimensions

Genetic, Epigenetic, Behavioral, and
Symbolic Variation in the History of Life

Eva Jablonka, and Marion J. Lamb

illustrated by Anna Zeligowski

revised edition



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Epigenetic Inheritance and Evolution -Eva Jablonka 1999 This book discusses the evidence for and against the heritability of acquired characters. Since it presents original and controversial arguments about the importance of epigenetic inheritance, this work provides a basis for discussion, modelling, and experimental investigation of the role of environmentally induced variation in evolution. Of interest to a broad range of biologists and other scientists. With a new Preface describing the impact of the hardback editionon subsequent research and a new Appendix of selected publications influenced by the book.

Evolution in Four Dimensions-I. Bernard Cohen 1999 Ideas about heredity and evolution are undergoing a revolutionary change. New findings in molecular biology challenge the gene-centered version of Darwinian theory according to which adaptation occurs only through natural selection of chance DNA variations. In Evolution in Four Dimensions, Eva Jablonka and Marion Lamb argue that there is more to heredity than genes. They trace four "dimensions" in evolution -- four inheritance systems that play a role in evolution: genetic, epigenetic (or non-DNA cellular transmission of traits), behavioral, and symbolic (transmission through language and other forms of symbolic communication). These systems, they argue, can all provide variations on which natural selection can act. Evolution in Four Dimensions offers a richer, more complex view of evolution than the gene-based, one-dimensional view held by many today. The new synthesis advanced by Jablonka and Lamb makes clear that induced and acquired changes also play a role in evolution. After discussing each of the four inheritance systems in detail, Jablonka and Lamb "put Humpty Dumpty together again" by showing how all of these systems interact. They consider how each may have originated and guided evolutionary history and they discuss the social and philosophical implications of the four-dimensional view of evolution. Each chapter ends with a dialogue in which the authors engage the contrarities of the fictional (and skeptical) "I.M.," or Ifcha Mistabra -- Aramaic for "the opposite conjecture" -- refining their arguments against I.M.'s vigorous counterarguments. The lucid and accessible text is accompanied by artist-physician Anna Zeligowski's lively drawings, which humorously and effectively illustrate the authors' points.

Making Sense of Life-Evelyn Fox KELLER 2009-06-30 What do biologists want? If, unlike their counterparts in physics, biologists are generally wary of a grand, overarching theory, at what kinds of explanation do biologists aim? How will we know when we have made sense of life? Such questions, Evelyn Fox Keller suggests, offer no simple answers. Explanations in the biological sciences are typically provisional and partial, judged by criteria as heterogeneous as their subject matter. It is Keller's aim in this bold and challenging book to account for this epistemological diversity—particularly in the discipline of developmental biology. In particular, Keller asks, what counts as an explanation of biological development in individual organisms? Her inquiry ranges from physical and mathematical models to more familiar explanatory metaphors to the dramatic contributions of recent technological developments, especially in imaging, recombinant DNA, and computer modeling and simulations. A history of the diverse and changing nature of biological explanation in a particularly charged field, Making Sense of Life draws our attention to the temporal, disciplinary, and cultural components of what biologists mean, and what they understand, when they propose to explain life.

The Evolution of the Sensitive Soul-Simona Ginsburg 2019-03-12 A new theory about the origins of consciousness that finds learning to be the driving force in the evolutionary transition to basic consciousness. What marked the evolutionary transition from organisms that lacked consciousness to those with consciousness—to minimal subjective experiencing, or, as Aristotle described it, "the sensitive soul"? In this book, Simona Ginsburg and Eva Jablonka propose a new theory about the origin of consciousness that finds learning to be the driving force in the transition to basic consciousness. Using a methodology similar to that used by scientists when they identified the transition from non-life to life, Ginsburg and Jablonka suggest a set of criteria, identify a marker for the transition to minimal consciousness, and explore the far-reaching biological, psychological, and philosophical implications. After presenting the historical, neurobiological, and philosophical foundations of their analysis, Ginsburg and Jablonka propose that the evolutionary marker of basic or minimal consciousness is a complex form of associative learning, which they term unlimited associative learning (UAL). UAL enables an organism to ascribe motivational value to a novel, compound, non-reflex-inducing stimulus or action, and use it as the basis for future learning. Associative learning, Ginsburg and Jablonka argue, drove the Cambrian explosion and its massive diversification of organisms. Finally, Ginsburg and Jablonka propose symbolic language as a similar type of marker for the evolutionary transition to human rationality—to Aristotle's "rational soul."

Developmental Plasticity and Evolution-Mary Jane West-Eberhard 2003-03-13 The first comprehensive synthesis on development and evolution: it applies to all aspects of development, at all levels of organization and in all organisms, taking advantage of modern findings on behavior, genetics, endocrinology, molecular biology, evolutionary theory and phylogenetics to show the connections between developmental mechanisms and evolutionary change. This book solves key problems that have impeded a definitive synthesis in the past. It uses new concepts and specific examples to show how to relate environmentally sensitive development to the genetic theory of adaptive evolution and to explain major patterns of change. In this book development includes not only embryology and the ontogeny of morphology, sometimes portrayed inadequately as governed by "regulatory genes," but also behavioral development and physiological adaptation, where plasticity is mediated by genetically complex mechanisms like hormones and learning. The book shows how the universal qualities of phenotypes—modular organization and plasticity—facilitate both integration and change. Here you will learn why it is wrong to describe organisms as genetically programmed; why environmental induction is likely to be more important in evolution than random mutation; and why it is crucial to consider both selection and developmental mechanism in explanations of adaptive evolution. This book satisfies the need for a truly general book on development, plasticity and evolution that applies to living organisms in all of their life stages and environments. Using an immense compendium of examples on many kinds of organisms, from viruses and bacteria to higher plants and animals, it shows how the phenotype is reorganized during evolution to produce novelties, and how alternative phenotypes occupy a pivotal role as a phase of evolution that fosters diversification and speeds change. The arguments of this book call for a new view of the major themes of evolutionary biology, as shown in chapters on gradualism, homology, environmental induction, speciation, radiation, macroevolution, punctation, and the maintenance of sex. No other treatment of development and evolution since Darwin's offers such a comprehensive and critical discussion of the relevant issues. Developmental Plasticity and Evolution is designed for biologists interested in the development and evolution of behavior, life-history patterns, ecology, physiology, morphology and speciation. It will also appeal to evolutionary paleontologists, anthropologists, psychologists, and teachers of general biology.

Evolution-James Alan Shapiro 2011 James A. Shapiro proposes an important new paradigm for understanding biological evolution, the core organizing principle of biology. Shapiro introduces crucial new molecular evidence that tests the conventional scientific view of evolution based on the neo-Darwinian synthesis, shows why this view is inadequate to today's evidence, and presents a compelling alternative view of the evolutionary process that reflects the shift in life sciences towards a more information- and systems-based approach in Evolution: A View from the 21st Century. Shapiro integrates advances in symbiogenesis, epigenetics, and saltationism into a unified approach that views evolutionary change as an active cell process, regulated epigenetically and capable of making rapid large changes by horizontal DNA transfer, inter-specific hybridization, whole genome doubling, symbiogenesis, or massive genome restructuring. Evolution marshals extensive evidence in support of a fundamental reinterpretation of evolutionary processes, including more than 1,100 references to the scientific literature. Shapiro's work will generate extensive discussion throughout the biological community, and may significantly change your own thinking about how life has evolved. It also has major implications for evolutionary computation, information science, and the growing synthesis of the physical and biological sciences.

Transformations of Lamarckism -Snait Gissis 2011 A reappraisal of Lamarckism—its historical impact and contemporary significance.
EVOLUTION -Michael Ruse 2009 An introduction to evolutionary biology, with sixteen essays about the history and philosophy of the field, related empirical and theoretical questions about topics such as speciation, adaptation, and development, and articles on important figures, social and political issues, and related religious topics.
The History of Life: A Very Short Introduction -Michael J. Benton 2008-11-27 This Very Short Introduction presents a succinct and accessible guide to the key episodes in the story of life on earth - from the very origins of life four million years ago to the extraordinary diversity of species around the globe today.

Evolution, the Extended Synthesis -Massimo Pigliucci 2010 Outgrowth of a meeting of the "Altenberg 16" at the Konrad Lorenz Institute for Evolution and Cognition Research in Altenberg, Austria, in July 2008. Cf. prof.
Consciousness In Four Dimensions: Biological Relativity and the Origins of Thought -Richard M. Pico 2001-11-07 In a book that will profoundly alter the modern discourse on mind and influence the practice of neuromedicine, neurobiologist/neuropsychiatrist, Richard M. Pico unveils a revolutionary new approach to understanding consciousness that pinpoints its origins in the brain. Called "Biological Relativity," the approach combines the laws of physics—especially Einstein's laws of relativity—to the latest breakthroughs in neuroscience, molecular biology, and computational theory to create a coherent four-dimensional model for explaining the origins of life and the emergence of complex biological systems—from the living cell to the thinking brain. In a fascinating, ambitious narrative that draws upon a lifetime of experimental and clinical work, Dr. Pico tells a riveting story that begins in the imponderably distant past, with the first proto-cell that endured long enough to become its own frame of reference—both structurally and temporally—and culminates with the most complex biological referent system known to science, the human brain. He then elaborates his groundbreaking theory through discussions of such things as the origins of language, music, and mathematics. He explains why he believes consciousness is uniquely human, and explores the causes and potential treatments for a variety of thought disorders.

The Epigenetics Revolution-Nessa Carey 2012-03-06 Epigenetics can potentially revolutionize our understanding of the structure and behavior of biological life on Earth. It explains why mapping an organism's genetic code is not enough to determine how it develops or acts and shows how nurture combines with nature to engineer biological diversity. Surveying the twenty-year history of the field while also highlighting its latest findings and innovations, this volume provides a readily understandable introduction to the foundations of epigenetics. Nessa Carey, a leading epigenetics researcher, connects the field's arguments to such diverse phenomena as how ants and queen bees control their colonies; why tortoiseshell cats are always female; why some plants need cold weather before they can flower; and how our bodies age and develop disease. Reaching beyond biology, epigenetics now informs work on drug addiction, the long-term effects of famine, and the physical and psychological consequences of childhood trauma. Carey concludes with a discussion of the future directions for this research and its ability to improve human health and well-being.

The Structure of Evolutionary Theory-Stephen Jay Gould 2002-03-21 The world's most revered and eloquent interpreter of evolutionary ideas offers here a work of explanatory force unprecedented in our time—a landmark publication, both for its historical sweep and for its scientific vision. With characteristic attention to detail, Stephen Jay Gould first describes the content and discusses the history and origins of the three core commitments of classical Darwinism: that natural selection works on organisms, not genes or species; that it is almost exclusively the mechanism of adaptive evolutionary change; and that these changes are incremental, not drastic. Next, he examines the three critiques that currently challenge this classic Darwinian edifice: that selection operates on multiple levels, from the gene to the group; that evolution proceeds by a variety of mechanisms, not just natural selection; and that causes operating at broader scales, including

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catastrophes, have figured prominently in the course of evolution. Then, in a stunning tour de force that will likely stimulate discussion and debate for decades, Gould proposes his own system for integrating these classical commitments and contemporary critiques into a new structure of evolutionary thought. In 2001 the Library of Congress named Stephen Jay Gould one of America's eighty-three Living Legends—people who embody the "quintessentially American ideal of individual creativity, conviction, dedication, and exuberance." Each of these qualities finds full expression in this peerless work, the likes of which the scientific world has not seen—and may not see again—for well over a century.

The Dependent Gene -David S. Moore 2003-02-05 Provides an analysis of the nature vs. nurture debate, arguing for an end to the "either/or" nature of the discussions in favor of a recognition that environmental and genetic factors interact throughout life to form human traits.
The Plausibility of Life -Marc W. Kirschner 2005-10-19 Two biologists tackle the unresolved question in the field of evolution: how have living organisms on Earth developed with such variety and complexity? In the 150 years since Darwin, the field of evolutionary biology has left a glaring gap in understanding how animals developed their astounding variety and complexity. The standard answer has been that small genetic mutations accumulate over time to produce wondrous innovations such as eyes and wings. Drawing on cutting-edge research across the spectrum of modern biology, Marc Kirschner and John Gerhart demonstrate how this stock answer is woefully inadequate. Rather they offer an original solution to the longstanding puzzle of how small random genetic change can be converted into complex, useful innovations. In a new theory they call "facilitated variation," Kirschner and Gerhart elevate the individual organism from a passive target of natural selection to a central player in the 3-billion-year history of evolution. In clear, accessible language, the authors invite every reader to contemplate daring new ideas about evolution. By closing the major gap in Darwin's theory Kirschner and Gerhart also provide a timely scientific rebuttal to modern critics of evolution who champion "intelligent design." "Makes for informative and enjoyable reading, and the issues the authors raise are worthy of attention." —American Scientist "Thought-provoking and lucidly written...The Plausibility of Life will help readers understand not just the plausibility of evolution, but its remarkable, inventive powers." —Sean Carroll, author of Endless Forms Most Beautiful: The New Science of Evo Devo

The Gene-Siddhartha Mukherjee 2016-05-17 The #1 NEW YORK TIMES Bestseller The basis for the PBS Ken Burns Documentary The Gene: An Intimate History From the Pulitzer Prize–winning author of The Emperor of All Maladies—a fascinating history of the gene and "a magisterial account of how human minds have laboriously, ingeniously picked apart what makes us tick" (Elle). "Sid Mukherjee has the uncanny ability to bring together science, history, and the future in a way that is understandable and riveting, guiding us through both time and the mystery of life itself." –Ken Burns "Dr. Siddhartha Mukherjee dazzled readers with his Pulitzer Prize-winning The Emperor of All Maladies in 2010. That achievement was evidently just a warm-up for his virtuoso performance in The Gene: An Intimate History, in which he braids science, history, and memoir into an epic with all the range and biblical thunder of Paradise Lost" (The New York Times). In this biography Mukherjee brings to life the quest to understand human heredity and its surprising influence on our lives, personalities, identities, fates, and choices. "Mukherjee expresses abstract intellectual ideas through emotional stories...[and] swaddles his medical rigor with rhapsodic tenderness, surprising vulnerability, and occasional flashes of pure poetry" (The Washington Post). Throughout, the story of Mukherjee's own family—with its tragic and bewildering history of mental illness—reminds us of the questions that hang over our ability to translate the science of genetics from the laboratory to the real world. In riveting and dramatic prose, he describes the centuries of research and experimentation—from Aristotle and Pythagoras to Mendel and Darwin, from Boveri and Morgan to Crick, Watson and Franklin, all the way through the revolutionary twenty-first century innovators who mapped the human genome. "A fascinating and often sobering history of how humans came to understand the roles of genes in making us who we are—and what our manipulation of those genes might mean for our future" (Milwaukee Journal-Sentinel), The Gene is the revelatory and magisterial history of a scientific idea coming to life, the most crucial science of our time, intimately explained by a master. "The Gene is a book we all should read" (USA TODAY).

The Developing Genome-David S. Moore 2015-01-29 Why do we grow up to look, act, and feel as we do? Through most of the twentieth century, scientists and laypeople answered this question by referring to two factors alone: our experiences and our genes. But recent discoveries about how genes work have revealed a new way to understand the developmental origins of our characteristics. These discoveries have emerged from the new science of behavioral epigenetics—and just as the whole world has now heard of DNA, "epigenetics" will be a household word in the near future. Behavioral epigenetics is important because it explains how our experiences get under our skin and influence the activity of our genes. Because of breakthroughs in this field, we now know that the genes we're born with don't determine if we'll end up easily stressed, likely to fall ill with cancer, or possessed of a powerful intellect. Instead, what matters is what our genes do. And because research in behavioral epigenetics has shown that our experiences influence how our genes function, this work has changed how scientists think about nature, nurture, and human development. Diets, environmental toxins, parenting styles, and other environmental factors all influence genetic activity through epigenetic mechanisms; this discovery has the potential to alter how doctors treat diseases, and to change how mental health professionals treat conditions from schizophrenia to post-traumatic stress disorder. These advances could also force a reworking of the theory of evolution that dominated twentieth-century biology, and even change how we think about human nature itself. In spite of the importance of this research, behavioral epigenetics is still relatively unknown to non-biologists. The Developing Genome is an introduction to this exciting new discipline; it will allow readers without a background in biology to learn about this work and its revolutionary implications.

Extended Heredity-Russell Bonduriansky 2020-04-14 There is much more to heredity than genes For much of the twentieth century it was assumed that genes alone mediate the transmission of biological information across generations and provide the raw material for natural selection. Yet, it's now clear that genes are not the only basis of heredity. In Extended Heredity, evolutionary biologists Russell Bonduriansky and Troy Day explore the latest research showing that what happens during our lifetimes—and even our parents' and grandparents' lifetimes—can influence the features of our descendants. Based on this evidence, Bonduriansky and Day develop an extended concept of heredity that updates ideas about how traits can and cannot be transmitted across generations, opening the door to a new understanding of inheritance, evolution, and even human health.

Elements of Evolutionary Genetics-Brian Charlesworth 2010-02-03 This textbook shows readers how models of the genetic processes involved in evolution are made (including natural selection, migration, mutation, and genetic drift in finite populations), and how the models are used to interpret classical and molecular genetic data. The material is intended for advanced level undergraduate courses in genetics and evolutionary biology, graduate students in evolutionary biology and human genetics, and researchers in related fields who wish to learn evolutionary genetics. The topics covered include genetic variation, DNA sequence variability and its measurement, the different types of natural selection and their effects (e.g. the maintenance of variation, directional selection, and adaptation), the interactions between selection and mutation or migration, the description and analysis of variation at multiple sites in the genome, genetic drift, and the effects of spatial structure.

Beyond the Meme-Alan C. Love 2019-09-03 Interdisciplinary perspectives on cultural evolution that reject meme theory in favor of a complex understanding of dynamic change over time How do cultures change? In recent decades, the concept of the meme, posited as a basic unit of culture analogous to the gene, has been central to debates about cultural transformation. Despite the appeal of meme theory, its simplification of complex interactions and other inadequacies as an explanatory framework raise more questions about cultural evolution than it answers. In Beyond the Meme, William C. Wimsatt and Alan C. Love assemble interdisciplinary perspectives on cultural evolution, providing a nuanced understanding of it as a process in which dynamic structures interact on different scales of size and time. By focusing on the full range of evolutionary processes across distinct contexts, from rice farming to scientific reasoning, this volume demonstrates how a thick understanding of change in culture emerges from multiple disciplinary vantage points, each of which is required to understand cultural evolution in all its complexity. The editors provide an extensive introductory essay to contextualize the volume, and Wimsatt contributes a separate chapter that systematically organizes the conceptual geography of cultural processes and phenomena. Any adequate account of the transmission, elaboration, and evolution of culture must, this volume argues, recognize the central roles that cognitive and social development play in cultural change and the complex interplay of technological, organizational, and institutional structures needed to enable and coordinate these processes. Contributors: Marshall Abrams, U of Alabama at Birmingham; Claes Andersson, Chalmers U of Technology; Mark A. Bedau, Reed College; James A. Evans, U of Chicago; Jacob G. Foster, U of California, Los Angeles; Michel Janssen, U of Minnesota; Sabina Leonelli, U of Exeter; Massimo Maiocchi, U of Chicago; Joseph D. Martin, U of Cambridge; Saikoko S. Mufwene, U of Chicago; Nancy J. Nersessian, Georgia Institute of Technology and Harvard U; Paul E. Smaldino, U of California, Merced; Anton Törnberg, U of Gothenburg; Petter Törnberg, U of Amsterdam; Gilbert B. Tostevin, U of Minnesota.

Four Billion Years -William F. Loomis 1988
River Out of Eden -Richard Dawkins 2008-08-04 How did the replication bomb we call "life" begin and where in the world, or rather, in the universe, is it heading? Writing with characteristic wit and an ability to clarify complex phenomena (the New York Times described his style as "the sort of science writing that makes the reader feel like a genius"), Richard Dawkins confronts this ancient mystery.
The Science of Consequences -Susan M. Schneider 2012-12-11 Actions have consequences—and the ability to learn from them revolutionized life on earth. While it's easy enough to see that consequences are important (where would we be without positive reinforcement?), few have heard there's a science of consequences, with principles that affect us every day. Despite their variety, consequences appear to follow a common set of scientific principles and share some similar effects in the brain—such as the "pleasure centers." Nature and nurture always work together, and scientists have demonstrated that learning from consequences predictably activates genes and restructures the brain. Applications are everywhere—at home, at work, and at school, and that's just for starters. Individually and societally, for example, self-control pits short-term against long-term consequences. Ten years in the making, this award-winning book tells a tale ranging from genetics to neurotransmitters, from emotion to language, from parenting to politics, taking an inclusive interdisciplinary approach to show how something so deceptively simple can help make sense of so much.

Genetics and the Origin of Species -Theodosius Dobzhansky 2013
Understanding Evolution -Kostas Kampourakis 2014-04-03 Bringing together conceptual obstacles and core concepts of evolutionary theory, this book presents evolution as straightforward and intuitive.
A Framework for K-12 Science Education -National Research Council 2012-02-28 Science, engineering, and technology permeate nearly every facet of modern life and hold the key to solving many of humanity's most pressing current and future challenges. The United States' position in the global economy is declining, in part because U.S. workers lack fundamental knowledge in these fields. To address the critical issues of U.S. competitiveness and to better prepare the workforce, A Framework for K-12 Science Education proposes a new approach to K-12 science education that will capture students' interest and provide them with the necessary foundational knowledge in the field. A Framework for K-12 Science Education outlines a broad set of expectations for students in science and engineering in grades K-12. These expectations will inform the development of new standards for K-12 science education and, subsequently, revisions to curriculum, instruction, assessment, and professional development for educators. This book identifies three dimensions that convey the core ideas and practices around which science and engineering education in these grades should be built. These three dimensions are: crosscutting concepts that unify the study of science through their common application across science and engineering; scientific and engineering practices; and disciplinary core ideas in the physical sciences, life sciences, and earth and space sciences and for engineering, technology, and the applications of science. The overarching goal is for all high school graduates to have sufficient knowledge of science and engineering to engage in public discussions on science-related issues, be careful consumers of scientific and technical information, and enter the careers of their choice. A Framework for K-12 Science Education is the first step in a process that can inform state-level decisions and achieve a research-grounded basis for improving science instruction and learning across the country. The book will guide standards developers, teachers, curriculum designers, assessment developers, state and district science administrators, and educators who teach science in informal environments.

Animal Traditions-Eytan Avital 2000-11-23 Animal Traditions maintains that the assumption that the selection of genes supplies both a sufficient explanation of the evolution and a true description of its course is, despite its almost universal acclaim, wrong. Eytan Avital and Eva Jablonka contend that evolutionary explanations must take into account the well-established fact that in mammals and birds, the transfer of learnt information is both ubiquitous and indispensable. The introduction of the behavioural inheritance system into the Darwinian explanatory scheme enables the authors to offer new interpretations for common behaviours such as maternal behaviours, behavioural conflicts within families, adoption and helping. This approach offers a richer view of heredity and evolution, integrates developmental and evolutionary processes, suggests new lines for research, and provides a constructive alternative to both the selfish gene and meme views of the world. It will make stimulating reading for all those interested in evolutionary biology, sociobiology, behavioural ecology and psychology.

Evolution in Four Dimensions-genetic-epigenetic-behavioral-and-symbolic-variation-in-the-history-of-life-life-and-mind-philosophical-issues-in-biology-and-psychology
Evolution in Four Dimensions -Eva Jablonka 2005 A groundbreaking synthesis of evolutionary theory arguing that induced and acquired changes also play a role in evolution.
Evolution in Four Dimensions, revised edition -Eva Jablonka 2014-03-28 A pioneering proposal for a pluralistic extension of evolutionary theory, now updated to reflect the most recent research.
Evolution in Four Dimensions, revised edition -Eva Jablonka 2014-04-11 A pioneering proposal for a pluralistic extension of evolutionary theory, now updated to reflect the most recent research. This new edition of the widely read Evolution in Four Dimensions has been revised to reflect the spate of new discoveries in biology since the book was first published in 2005, offering corrections, an updated bibliography, and a substantial new chapter. Eva Jablonka and Marion Lamb's pioneering argument proposes that there is more to heredity than genes. They describe four "dimensions" in heredity—four inheritance systems that play a role in evolution: genetic, epigenetic (or non-DNA cellular transmission of traits), behavioral, and symbolic (transmission through language and other forms of symbolic communication). These systems, they argue, can all provide variations on which natural selection can act. Jablonka and Lamb present a richer, more complex view of evolution than that offered by the gene-based Modern Synthesis, arguing that induced and acquired changes also play a role. Their lucid and accessible text is accompanied by artist-physician Anna Zeligowski's lively drawings, which humorously and effectively illustrate the authors' points. Each chapter ends with a dialogue in which the authors refine their arguments against the vigorous skepticism of the fictional "I.M." (for Iпча Mistabra—Aramaic for "the opposite conjecture"). The extensive new chapter, presented engagingly as a dialogue with I.M., updates the information on each of the four dimensions—with special attention to the epigenetic, where there has been an explosion of new research. Praise for the first edition "With courage and verve, and in a style accessible to general readers, Jablonka and Lamb lay out some of the exciting new pathways of Darwinian evolution that have been uncovered by contemporary research." —Evelyn Fox Keller, MIT, author of Making Sense of Life: Explaining Biological Development with Models, Metaphors, and Machines "In their beautifully written and impressively argued new book, Jablonka and Lamb show that the evidence from more than fifty years of molecular, behavioral and linguistic studies forces us to reevaluate our inherited understanding of evolution." —Oren Harman, The New Republic "It is not only an enjoyable read, replete with ideas and facts of interest but it does the most valuable thing a book can do—it makes you think and reexamine your premises and long-held conclusions." —Adam Wilkins, BioEssays

Concepts of Biology-Samantha Fowler 2018-01-07 Concepts of Biology is designed for the single-semester introduction to biology course for non-science majors, which for many students is their only college-level science course. As such, this course represents an important opportunity for students to develop the necessary knowledge, tools, and skills to make informed decisions as they continue with their lives. Rather than being mired down with facts and vocabulary, the typical non-science major student needs information presented in a way that is easy to read and understand. Even more importantly, the content should be meaningful. Students do much better when they understand why biology is relevant to their

everyday lives. For these reasons, Concepts of Biology is grounded on an evolutionary basis and includes exciting features that highlight careers in the biological sciences and everyday applications of the concepts at hand.We also strive to show the interconnectedness of topics within this extremely broad discipline. In order to meet the needs of today’s instructors and students, we maintain the overall organization and coverage found in most syllabi for this course. A strength of Concepts of Biology is that instructors can customize the book, adapting it to the approach that works best in their classroom. Concepts of Biology also includes an innovative art program that incorporates critical thinking and clicker questions to help students understand—and apply—key concepts.

Teaching About Evolution and the Nature of Science-National Academy of Sciences 1998-04-06 Today many school students are shielded from one of the most important concepts in modern science: evolution. In engaging and conversational style, Teaching About Evolution and the Nature of Science provides a well-structured framework for understanding and teaching evolution. Written for teachers, parents, and community officials as well as scientists and educators, this book describes how evolution reveals both the great diversity and similarity among the Earth’s organisms; it explores how scientists approach the question of evolution; and it illustrates the nature of science as a way of knowing about the natural world. In addition, the book provides answers to frequently asked questions to help readers understand many of the issues and misconceptions about evolution. The book includes sample activities for teaching about evolution and the nature of science. For example, the book includes activities that investigate fossil footprints and population growth that teachers of science can use to introduce principles of evolution. Background information, materials, and step-by-step presentations are provided for each activity. In addition, this volume: Presents the evidence for evolution, including how evolution can be observed today. Explains the nature of science through a variety of examples. Describes how science differs from other human endeavors and why evolution is one of the best avenues for helping students understand this distinction. Answers frequently asked questions about evolution. Teaching About Evolution and the Nature of Science builds on the 1996 National Science Education Standards released by the National Research Council—and offers detailed guidance on how to evaluate and choose instructional materials that support the standards. Comprehensive and practical, this book brings one of today’s educational challenges into focus in a balanced and reasoned discussion. It will be of special interest to teachers of science, school administrators, and interested members of the community.

Biology-Robert Meeks 2016-04-23 PEOPLE HAVE BECOME SO BUSY WITH EVERYDAY ACTIVITIES THAT THEY SELDOM HAVE TIME TO THINK ABOUT EVERYTHING THAT SURROUNDS THEM. THE WORLD IS FULL OF LIFE, EVEN IN THE SEEMINGLY MOST INSIGNIFICANT THINGS. WOULDN’T IT BE WONDERFUL TO JUST SIT BACK AND TRY TO LEARN MORE ABOUT THE LIVING AND BREATHING SPECIES THAT SURROUND US BUT GO UNNOTICED EVERYDAY? Biology is the science of life, but while many of us may be familiar with the subject, only a few may be aware that biology encompasses much more than just humans and the other species that inhabit the earth. It is, perhaps, the most expansive and interesting subject that you could learn about. You may ask, if it is so expansive, then how would it be possible to learn all the important things there are to know about biology? The answer lies in this book, which would teach you all the most significant concepts to make you realize how biology has implications in our past, our present, and yes, even our future. This book is the only one you need to delve into the world of biology. It will teach you, in simple and easy-to-understand terms, how biology comes alive in our daily activities. Here’s what this book contains: What exactly does the study of biology include How can biology help us understand our past Which branches of biology is relevant to our present What implications biology has on our future PLUS: Delve into the world of genetics Understand the how and why of human evolution Know the men and women who have spearheaded breakthroughs in biology You won’t get information this comprehensive anywhere else! So act right now! GET YOUR COPY TODAY!

A Troublesome Inheritance-Nicholas Wade 2014-05-06 Drawing on startling new evidence from the mapping of the genome, an explosive new account of the genetic basis of race and its role in the human story Fewer ideas have been more toxic or harmful than the idea of the biological reality of race, and with it the idea that humans of different races are biologically different from one another. For this understandable reason, the idea has been banished from polite academic conversation. Arguing that race is more than just a social construct can get a scholar run out of town, or at least off campus, on a rail. Human evolution, the consensus view insists, ended in prehistory. Inconveniently, as Nicholas Wade argues in A Troublesome Inheritance, the consensus view cannot be right. And in fact, we know that populations have changed in the past few thousand years—to be lactose tolerant, for example, and to survive at high altitudes. Race is not a bright-line distinction; by definition it means that the more human populations are kept apart, the more they evolve their own distinct traits under the selective pressure known as Darwinian evolution. For many thousands of years, most human populations stayed where they were and grew distinct, not just in outward appearance but in deeper senses as well. Wade, the longtime journalist covering genetic advances for The New York Times, draws widely on the work of scientists who have made crucial breakthroughs in establishing the reality of recent human evolution. The most provocative claims in this book involve the genetic basis of human social habits. What we might call middle-class social traits—thrift, docility, nonviolence—have been slowly but surely inculcated genetically within agrarian societies, Wade argues. These “values” obviously had a strong cultural component, but Wade points to evidence that agrarian societies evolved away from hunter-gatherer societies in some crucial respects. Also controversial are his findings regarding the genetic basis of traits we associate with intelligence, such as literacy and numeracy, in certain ethnic populations, including the Chinese and Ashkenazi Jews. Wade believes deeply in the fundamental equality of all human peoples. He also believes that science is best served by pursuing the truth without fear, and if his mission to arrive at a coherent summa of what the new genetic science does and does not tell us about race and human history leads straight into a minefield, then so be it. This will not be the last word on the subject, but it will begin a powerful and overdue conversation.

Microsatellite Markers-Ibrokhim Y. Abdurakhmonov 2016-11-30 Microsatellite or so-called simple sequence repeat (SSR) markers have been one of the most reliable molecular markers derived from the DNA molecule, which were widely and successfully used for more than 25 years in the genetic studies of environmental, agricultural, and biomedical sciences. The objective of this Microsatellite Markers book is to rehighlight and provide some updates on previous and recent utilization of microsatellite markers for various applications in agriculture and medicine, which void emerging opinion on “full death” of microsatellites as useful genetic markers. Chapters presented here demonstrate the future benefit of SSRs in many genetic studies as well as disease diagnosis and prognosis.

Biology of Ageing-Marion J. Lamb 1977

Who We Are and How We Got Here-David Reich 2018-03-27 David Reich describes how the revolution in the ability to sequence ancient DNA has changed our understanding of the deep human past. This book tells the emerging story of our often surprising ancestry - the extraordinary ancient migrations and mixtures of populations that have made us who we are.

Genetic Diversity and Disease Susceptibility-Yamin Liu 2018-10-17 Polymorphism or variation in DNA sequence can affect individual phenotypes such as color of skin or eyes, susceptibility to diseases, and response to drugs, vaccines, chemicals, and pathogens. Especially, the interfaces between genetics, disease susceptibility, and pharmacogenomics have recently been the subject of intense research activity. This book is a self-contained collection of valuable scholarly papers related to genetic diversity and disease susceptibility, pharmacogenomics, ongoing advances in technology, and analytic methods in this field. The book contains nine chapters that cover the three main topics of genetic polymorphism, genetic diversity, and disease susceptibility and pharmacogenomics. Hence, this book is particularly useful to academics, scientists, physicians, pharmacists, practicing researchers, and postgraduate students whose work relates to genetic polymorphisms.

Modern Genetic Analysis- 1999

DNA-James D. Watson 2009-01-21 Fifty years ago, James D. Watson, then just twentyfour, helped launch the greatest ongoing scientific quest of our time. Now, with unique authority and sweeping vision, he gives us the first full account of the genetic revolution—from Mendel’s garden to the double helix to the sequencing of the human genome and beyond. Watson’s lively, panoramic narrative begins with the fanciful speculations of the ancients as to why “like begets like” before skipping ahead to 1866, when an Austrian monk named Gregor Mendel first deduced the basic laws of inheritance. But genetics as we recognize it today—with its capacity, both thrilling and sobering, to manipulate the very essence of living things—came into being only with the rise of molecular investigations culminating in the breakthrough discovery of the structure of DNA, for which Watson shared a Nobel prize in 1962. In the DNA molecule’s graceful curves was the key to a whole new science. Having shown that the secret of life is chemical, modern genetics has set mankind off on a journey unimaginable just a few decades ago. Watson provides the general reader with clear explanations of molecular processes and emerging technologies. He shows us how DNA continues to alter our understanding of human origins, and of our identities as groups and as individuals. And with the insight of one who has remained close to every advance in research since the double helix, he reveals how genetics has unleashed a wealth of possibilities to alter the human condition—from genetically modified foods to genetically modified babies—and transformed itself from a domain of pure research into one of big business as well. It is a sometimes topsy-turvy world full of great minds and great egos, driven by ambitions to improve the human condition as well as to improve investment portfolios, a world vividly captured in these pages. Facing a future of choices and social and ethical implications of which we dare not remain uninformed, we could have no better guide than James Watson, who leads us with the same bravura storytelling that made The Double Helix one of the most successful books on science ever published. Infused with a scientist’s awe at nature’s marvels and a humanist’s profound sympathies, DNA is destined to become the classic telling of the defining scientific saga of our age.