Evolution In Four Dimensions Genetic Epigenetic Behavioral And Symbolic Variation The History Of Life Eva Jablonka

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The Developing Genome MIT Press

A comprehensive treatment of the concept of causation in evolutionary biology that makes clear its central role in both historical and contemporary debates. Most scientific explanations are causal. This is certainly the case in evolutionary biology, which seeks to explain the diversity of life and the adaptive fit between organisms and their surroundings. The nature of causation in evolutionary biology, however, is contentious. How causation is understood shapes the structure of evolutionary theory, and historical and contemporary debates in evolutionary biology have revolved around the nature of causation. Despite its centrality, and differing views on the subject, the major conceptual issues regarding the nature of causation in evolutionary biology are rarely addressed. This volume fills the gap, bringing together biologists and philosophers to offer a comprehensive, interdisciplinary treatment of evolutionary causation. Contributors first address biological motivations for rethinking evolutionary causation, considering the ways in which development, extra-genetic inheritance, and niche construction challenge notions of cause and process in evolution, and describing how alternative representations of evolutionary causation can shed light on a range of evolutionary problems. Contributors then analyze evolutionary causation from a philosophical perspective, considering such topics as causal entanglement, the commingling of organism and environment, and the relationship between causation and information. Contributors John A. Baker, Lynn Chiu, David I. Dayan, Ren é e A. Duckworth, Marcus W Feldman, Susan A. Foster, Melissa A. Graham, Heikki Helanter ä , Kevin N. Laland, Armin P. Moczek, John Odling-Smee, Jun Otsuka, Massimo Pigliucci, Arnaud Pocheville, Arlin Stoltzfus, Karola Stotz, Sonia E. Sultan, Christoph Thies, Tobias Uller, Denis M. Walsh, Richard A. Watson

Extended Heredity Bradford Books

A philosophical account of human nature that defends the concept against dehumanization, Darwinian, and developmentalist challenges. Human nature has always been a foundational issue for philosophy. What does

it mean to have a human nature? Is the concept the relic of a bygone age? What is the use of such a concept? What are the epistemic and ontological commitments people make when they use the concept? In What's Left of Human Nature? Maria Kronfeldner offers a philosophical account of human nature that defends the concept against contemporary criticism. In particular, she takes on challenges related to social misuse of the concept that dehumanizes those regarded as lacking human nature (the dehumanization challenge); the conflict between Darwinian thinking and essentialist concepts of human nature (the Darwinian challenge); and the consensus that evolution, heredity, and ontogenetic development result from nurture and nature. After answering each of these challenges, Kronfeldner presents a revisionist account of human nature that minimizes dehumanization and does not fall back on outdated biological ideas. Her account is post-essentialist because it eliminates the concept of an essence of being human; pluralist in that it argues that there are different things in the world that correspond to three different post-essentialist concepts of human nature; and interactive because it understands nature and nurture as interacting at the developmental, epigenetic, and evolutionary levels. On the basis of this, she introduces a dialectical concept of an ever-changing and "looping" human nature. Finally, noting the essentially contested character of the concept and the ambiguity and redundancy of the terminology, she wonders if we should simply eliminate the term "human nature" altogether.

Biology beyond genes Princeton University Press

Genomic imprinting allows scientists to trace genes to the parent of origin. This volume presents a collection of 13 papers by David Haig (organisimic and evolutionary biology, Harvard U.) on genomic imprinting. He argues that our paternally and maternally active genes do not work in cooperation with each other and in fact are in competition. Each paper is followed by commentary by the author, providing background information and discussing developments since its publication. Annotation copyrighted by Book News Inc., Portland, OR.

The Emergence of Life on Earth Stanford University Press

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

Essays on His Life and Thought in Russia and America MIT Press

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.

Evolutionary Causation Cambridge University Press

Illuminating the processes and patterns that link genotype to phenotype, epigenetics seeks to explain features, characters, and developmental mechanisms that can only be understood in terms of interactions that arise above the level of the gene. With chapters written by leading authorities, this volume offers a broad integrative survey of epigenetics. Approaching this complex subject from a variety of perspectives, it presents a broad, historically grounded view that demonstrates the utility of this approach for understanding complex biological

systems in development, disease, and evolution. Chapters cover such topics as morphogenesis and organ formation, conceptual foundations, and cell differentiation, and together demonstrate that the integration of epigenetics into mainstream developmental biology is essential for answering fundamental questions about how phenotypic traits are produced.

Transformations of Lamarckism Princeton University Press

"Essential reading for people in disciplines ranging from philosophy to biology. It is simply the best general book that I know on the question of the origin of life." --Michael Ruse, author of Mystery of Mysteries: Is Evolution a Social Construction? "Fry has fashioned a masterful account of the history, philosophy, and science of the origin of life and the possibility of extraterrestrial life. Her story weaves profound Western ideas of who we are and where we came from, from Aristotle to Gould, from Kant to NASA." --Woodruff Sullivan, University of Washington "A rich source for the specialist and thought-provoking reading for the lay person." Gunter Wachtershauser, University of Regensburg, Germany How did life emerge on Earth? Is there life on other worlds? These questions, until recently confined to the pages of speculative essays and tabloid headlines, are now the subject of legitimate scientific research. This book presents a unique perspective--a combined historical, scientific, and philosophical anaylsis, which does justice to the complex nature of the subject. The book's first part offers an overview of the main ideas on the origin of life as they developed from antiquity until the twentieth century. The second, more detailed part of the book examines contemporary theories and major debates within the origin-of-life scientific community. Topics inclue: - Aristotle and the Greek atomists' conceptions of the organism - Alexander Oparin and J.B.S. Haldane's 1920s breakthrough papers - Possible life on Mars?

Evolution in Four Dimensions, revised edition MIT Press

Despite its almost universal acclaim, the authors contend that evolutionary explanations must take into account the well-established fact that in mammals and birds, the transfer of learned information is both ubiquitous and indispensable. Animal Traditions maintains the assumption that selection of genes supplies both a sufficient explanation of evolution and a true description of its course. The introduction of the behavioral inheritance system into the Darwinian explanatory scheme enables the authors to offer new interpretations for common behaviors such as maternal behaviors, behavioral 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. This book will make stimulating reading for all those interested in evolutionary biology, sociobiology, behavioral ecology, and psychology.

The Radical New Discoveries about the Origins and Evolution of Life on Earth Pearson Education

This volume not only offers an intellectual biography of one of the most important biologists and social thinkers of the twentieth century but also illuminates the development of evolutionary studies in Russia and in the West. Theodosius Dobzhansky (1900-1975), a creator of the "evolutionary synthesis" and the author of its first modern statement, Genetics and the Origin of Species (1937), founded modern Western population genetics and wrote many popular books on such topics as human evolution, race and racism, equality, and human destiny. In this, the

first book devoted to an analysis of the historical, scientific, and cultural dimensions of Dobzhansky's life and thought, an international group of historians, biologists, and philosophers addresses the full span of his career in Russia and the United States. Beginning with the reminiscences of his daughter, Sophia Dobzhansky Coe, these essays cover Dobzhansky's Russian roots (Nikolai L. Krementsov, Daniel A. Alexandrov, Mikhail B. Konashev), the Morgan Lab (Garland E. Allen, William B. Provine, Robert E. Kohler, Richard M. Burian), his scientific legacy (Scott F. Gilbert, Bruce Wallace, Charles E. Taylor), and his social, political, philosophical, and religious thought (Costas B. Krimbas, John Beatty, Diane B. Paul, Michael Ruse). Originally published in 1994. The Princeton Legacy Library uses the latest print-on-demand technology to again make available previously out-of-print books from the distinguished backlist of Princeton University Press. These editions preserve the original texts of these important books while presenting them in durable paperback and hardcover editions. The goal of the Princeton Legacy Library is to vastly increase access to the rich scholarly heritage found in the thousands of books published by Princeton University Press since its founding in 1905.

The Plausibility of Life Cambridge University Press

Bringing together conceptual obstacles and core concepts of evolutionary theory, this book presents evolution as straightforward and intuitive.

Harvard University Press

What is Life? Decades of research have resulted in the full mapping of the human genome - three billion pairs of code whose functions are only now being understood. The gene's eye view of life, advocated by evolutionary biology, sees living bodies as mere vehicles for the replication of the genetic codes. But for a physiologist, working with the living organism, the view is a very different one. Denis Noble is a world renowned physiologist, and sets out an alternative view to the question - one that becomes deeply significant in terms of the living, breathing organism. The genome is not life itself. Noble argues that far from genes building organisms, they should be seen as prisoners of the organism. The view of life presented in this little, modern, post-genome project reflection on the nature of life, is that of the systems biologist: to understand what life is, we must view it at a variety of different levels, all interacting with each other in a complex web. It is that emergent web, full of feedback between levels, from the gene to the wider environment, that is life. It is a kind of music. Including stories from Noble's own research experience, his work on the heartbeat, musical metaphors, and elements of linguistics and Chinese culture, this very personal and at times deeply lyrical book sets out the systems biology view of life.

Inheritance Systems and the Extended Synthesis Univ of California Press

The Evolution of Molecular Biology: The Search for the Secrets of Life provides the historical knowledge behind techniques founded in molecular biology, also presenting an appreciation of how, and by whom, these discoveries were made. It deals with the evolution of intellectual concepts in the context of active research in an approachable language that accommodates readers from a variety of backgrounds. Each chapter contains a

prologue and epilogue to create continuity and provide a complete framework of molecular biology. This foundational work also functions as a historical and conceptual supplement to many related courses in biochemistry, biology, chemistry, genetics and history of science. In addition, the book demonstrates how the roots of discovery and advances–and an individual's own research–have grown out of the history of the field, presenting a more complete understanding and context for scientific discovery. Expands on the development of molecular biology from the convergence of two independent disciplines, biochemistry and genetics Discusses the value of molecular biology in a variety of applications Includes research ethics and the societal implications of research Emphasizes the human aspects of research and the consequences of such advances to society

A Post-Essentialist, Pluralist, and Interactive Account of a Contested Concept Rutgers University Press

Since its origin in the early 20th century, the Modern Synthesis theory of evolution has grown to become the orthodox view on the process of organic evolution. Its central defining feature is the prominence it accords to genes in the explanation of evolutionary dynamics. Since the advent of the 21st century, however, the Modern Synthesis has been subject to repeated and sustained challenges. These are largely empirically driven. In the last two decades, evolutionary biology has witnessed unprecedented growth in the understanding of those processes that underwrite the development of organisms and the inheritance of characters. The empirical advances usher in challenges to the conceptual foundations of evolutionary theory. The extent to which the new biology challenges the Modern Synthesis has been the subject of lively debate. Many current commentators charge that the new biology of the 21st century calls for a revision, extension, or wholesale rejection of the Modern Synthesis Theory of evolution. Defenders of the Modern Synthesis maintain that the theory can accommodate the exciting new advances in biology. The original essays collected in this volume survey the various challenges to the Modern Synthesis arising from the new biology of the 21st century. The authors are evolutionary biologists, philosophers of science, and historians of biology from Europe and North America. Each of the essays discusses a particular challenge to the Modern Synthesis treatment of inheritance, development, or adaptation. Taken together, the essays cover a spectrum of views, from those that contend that the Modern Synthesis can rise to the challenges of the new biology, with little or no revision required, to those that call for the abandonment of the Modern Synthesis. The collection will be of interest to researchers and students in evolutionary biology, and the philosophy and history of the biological sciences.

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

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 Ipcha 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

From Subtle Fluids to Molecular Biology

Evolution in Four Dimensions, revised editionGenetic, Epigenetic, Behavioral, and Symbolic Variation in the History of Life

A reappraisal of Lamarckism—its historical impact and contemporary significance. In 1809—the year of Charles Darwin's birth—Jean-Baptiste Lamarck published Philosophie zoologique, the first comprehensive and systematic theory of biological evolution. The Lamarckian approach emphasizes the generation of developmental variations; Darwinism stresses selection. Lamarck's ideas were eventually eclipsed by Darwinian concepts, especially after the emergence of the Modern Synthesis in the twentieth century. The different approaches—which can be seen as complementary rather than mutually exclusive—have important implications for the kinds of questions biologists ask and for the type of research they conduct. Lamarckism has been evolving—or, in Lamarckian terminology, transforming—since Philosophie zoologique's description of biological processes mediated by "subtle fluids." Essays in this book focus on new developments in biology that make Lamarck's ideas relevant not only to modern empirical and theoretical research but also to problems in the philosophy of biology. Contributors discuss the historical transformations of Lamarckism from the 1820s to the 1940s, and the different understandings of Lamarck and Lamarckism; the Modern Synthesis and its emphasis on Mendelian genetics; theoretical and experimental research on such "Lamarckian" topics as plasticity, soft (epigenetic) inheritance, and individuality; and the importance of a developmental

approach to evolution in the philosophy of biology. The book shows the advantages of a "Lamarckian" perspective on evolution. Indeed, the development-oriented approach it presents is becoming central to current evolutionary studies—as can be seen in the burgeoning field of Evo-Devo. Transformations of Lamarckism makes a unique contribution to this research.

Refiguring Life Cambridge University Press

Refiguring Life begins with the history of genetics and embryology, showing how discipline-based metaphors have directed scientists' search for evidence. Keller continues with an exploration of the border traffic between biology and physics, focusing on the question of life and the law of increasing entropy. In a final section she traces the impact of new metaphors, born of the computer revolution, on the course of biological research. Keller shows how these metaphors began as objects of contestation between competing visions of the life sciences, how they came to be recast and appropriated by already established research agendas, and how in the process they ultimately came to subvert those same agendas. Refiguring Life explains how the metaphors and machinery of research are not merely the products of scientific discovery but actually work together to map out the territory along which new metaphors and machines can be constructed. Through their dynamic interaction, Keller points out, they define the realm of the possible in science. Drawing on a remarkable spectrum of theoretical work ranging from Schroedinger to French psychoanalyst Jacques Lacan, Refiguring Life fuses issues already prominent in the humanities and social sciences with those in the physical and natural sciences, transgressing disciplinary boundaries to offer a broad view of the natural sciences as a whole. Moving gracefully from genetics to embryology, from physics to biology, from cyberscience to molecular biology, Evelyn Fox Keller demonstrates that scientific inquiry cannot pretend to stand apart from the issues and concerns of the larger society in which it exists.

A History of the Genetic Code McGraw Hill Professional

A novel account of the evolution of language and the cognitive capacities on which language depends. In From Signal to Symbol, Ronald Planer and Kim Sterelny propose a novel theory of language: that modern language is the product of a long series of increasingly rich protolanguages evolving over the last two million years. Arguing that language and cognition coevolved, they give a central role to archaeological evidence and attempt to infer cognitive capacities on the basis of that evidence, which they link in turn to communicative capacities. Countering other accounts, which move directly from archaeological traces to language, Planer and Sterelny show that rudimentary forms of many of the elements on which language depends can be found in the great apes and were part of the equipment of the earliest species in our lineage. After outlining the constraints a theory of the evolution of language should satisfy and filling in the details of their model, they take up the evolution of words, composite utterances, and hierarchical structure. They consider the transition from a predominantly gestural to a predominantly vocal form of language and

discuss the economic and social factors that led to language. Finally, they evaluate their theory in terms of the constraints previously laid out.

Biology of Ageing OUP Oxford

Microbial Iron Metabolism: A Comprehensive Treatise provides a comprehensive treatment of microbial iron metabolism. It aims to contribute to an increased understanding of the path of iron in microbial species and, eventually, in the plant and animal. The book is organized into five parts. Part I describes some features of iron and its function in the microbial world. These include a historical sketch of the recognition of the importance of iron in cellular physiology; a description of certain physical properties of ferrous and ferric ions; and a list of various known biocoordination derivatives grouped by ligand atom. Metabolism under iron-limited conditions is also examined. Part II presents studies on iron transport, biosynthesis, and storage in microorganisms. Part III examines iron enzymes and proteins, including ferredoxin, rubredoxin, nitrogenase, and hydrogenase. Part IV deals with reactions of inorganic substrates. Part V presents a study on the role of bacterial iron metabolism in infection and immunity.

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

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.

Challenging the Modern Synthesis Cambridge University Press

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.”