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The Structure of Evolutionary Theory University of Chicago Press

The seemingly innocent observation that the activities of organisms bring about changes in environments is so obvious that it seems an unlikely focus for a new line of thinking about evolution. Yet niche construction--as this process of organism-driven environmental modification is known--has hidden complexities. By transforming biotic and abiotic sources of natural selection in external environments, niche construction generates feedback in evolution on a scale hitherto underestimated--and in a manner that transforms the evolutionary dynamic. It also plays a critical role in ecology, supporting ecosystem engineering and influencing the flow of energy and nutrients through ecosystems. Despite this, niche construction has been given short shrift in theoretical biology, in part because it cannot be fully understood within the framework of standard evolutionary theory. Wedding evolution and ecology, this book extends evolutionary theory by formally including niche construction and ecological inheritance as additional evolutionary processes. The authors support their historic move with empirical data, theoretical population genetics, and conceptual models. They also describe new research methods capable of testing the theory. They demonstrate how their theory can resolve long-standing problems in ecology, particularly by advancing the sorely needed synthesis of ecology and evolution, and how it offers an evolutionary basis for the human sciences. Already hailed as a pioneering work by some of the world's most influential biologists, this is a rare, potentially field-changing contribution to the biological sciences.

Unifying Biology HARCOURT EDUCATION COMPANY

Weaves together the many threads of modern work in genetics, palaeontology, geology, molecular biology, anatomy and development that demonstrate the processes first proposed by Darwin and to present them in a crisp, lucid, account accessible to a wide audience.

The Eclipse of Darwinism John Wiley & Sons

This critical collection of essays represents the best of the best when it comes to philosophy of biology. Many chapters treat evolution as a biological phenomenon, but the author is more generally concerned with science itself. Present-day science, particularly current views on systematics and biological evolution are investigated. The aspects of these sciences that are relevant to the general analysis of selection processes are presented, and they also serve to exemplify the general characteristics exhibited by science since its inception.

Evolution Under the Microscope Princeton University Press

Rethinking Evolution links Darwin's early insights to the molecular realm inside living cells. This updated evolutionary synthesis provides an accessible explanation for biological complexity that cuts through the confusion surrounding evolutionary theory in a practical way.In addition to a wide-ranging survey of proposed updates to the modern synthesis, this title provides extraordinary new insights including emergent evolutionary potential and the generative phenotype. Drawing on well-characterized empirical facts, Rethinking Evolution transcends classical Darwinian natural selection while retaining those core principles that have stood the test of time.The updated synthesis brings a broad spectrum of specialized research together to provide a more plausible naturalistic explanation for biological evolution than ever before. Perspectives ranging from the role of energy in the origin of life to the networks of protein-DNA interactions that govern multicellular development are woven together in a robust conceptual fabric consistent with 21st century cutting-edge research.Inspired in part by the surprising ways that DNA sequences change — such as his early discovery of a fundamental mispairing mechanism by which DNA sequences expand — and drawing on a career's worth of experience both as a research scientist as well as a biology and chemistry tutor — the author provides an engaging account that is essential reading — both for the public awareness and understanding of the science of evolution and for students and professionals in the biomedical sciences.Related Link(s)

Independent Birth of Organisms Ithaca, N.Y. : Cornell University Press

Although evolutionary developmental biology is a new field, its origins lie in the last century; the search for connections between embryonic development (ontogeny) and evolutionary change (phylogeny) has been a long one. Evolutionary developmental biology is however more than just a fusion of the fields of developmental and evolutionary biology. It forges a unification of genomic, developmental, organismal, population and natural selection approaches to evolutionary change. It is concerned with how developmental processes evolve; how evolution produces novel structures, functions and behaviours; and how development, evolution and ecology are integrated to bring about and stabilize evolutionary change. The previous edition of this title, published in 1992, defined the terms and laid out the field for evolutionary developmental biology. This field is

now one of the most active and fast growing within biology and this is reflected in this second edition, which is more than twice the length of the original and brought completely up to date. There are new chapters on major transitions in animal evolution, expanded coverage of comparative embryonic development and the inclusion of recent advances in genetics and molecular biology. The book is divided into eight parts which: place evolutionary developmental biology in the historical context of the search for relationships between development and evolution; detail the historical background leading to evolutionary embryology; explore embryos in development and embryos in evolution; discuss the relationship between embryos, evolution, environment and ecology; discuss the dilemma for homology of the fact that development evolves; deal with the importance of understanding how embryos measure time and place both through development and evolutionarily through heterochrony and heterotrophy; and set out the principles and processes that underlie evolutionary developmental biology. With over one hundred illustrations and photographs, extensive cross-referencing between chapters and boxes for ancillary material, this latest edition will be of immense interest to graduate and advanced undergraduate students in cell, developmental and molecular biology, and in zoology, evolution, ecology and entomology; in fact anyone with an interest in this new and increasingly important and interdisciplinary field which unifies biology.

Modern Biology and the Theory of Evolution Springer

In this pioneering study of the first major challenges to Darwinism, Peter J. Bowler examines the competing theories of evolution, identifies their intellectual origins, and describes the process by which the modern concept of evolution emerged. Describing the variety of influences that drove scientists to challenge Darwin's conclusions, Bowler reevaluates the influence of social forces on the scientific community and explores the broad philosophical, ideological, and social implications of scientific theories.

The Theory of Evolution Harvard University Press

The publication of Charles Darwin’s The Origin of Species in 1859 marked a dramatic turning point in scientific thought, but it also ignited a firestorm of controversy. More than two decades following his intercontinental voyage aboard the HMS Beagle, the English naturalist carefully advanced his theory of evolution by natural selection, offering coherent and highly readable views of adaptation, survival of the fittest, and other concepts that form the foundation of modern evolutionary theory. The first edition of the book sold out on the day of publication, and as it continues to spark heated debate 150 years later, the work's impact is undeniable. Launching modern biology and informing virtually all contemporary literary, philosophical, and religious thinking, this is a book that changed the world, and now it is available with a new introduction. The Knickerbocker Classics bring together the works of classic authors from around the world in stunning gift editions to be collected and enjoyed. Complete and unabridged, these elegantly designed cloth-bound hardcovers feature a slipcase and ribbon marker, as well as a comprehensive introduction providing the reader with enlightening information on the author's life and works.

The Growth of Biological Thought Genome Publications

Introduced in 1859, Charles Darwin's theory of evolution generated hot debate and controversy. Today nearly all reputable scientists agree: evolution did happen and natural selection was its main driving force. Yet a century and a half after Darwin, the theory of evolution is still being fought over with a ferocity that has rarely been equaled in the annals of science. What are scientists arguing about? And why are their exchanges sometimes so bitter? In The Evolutionists, Richard Morris vividly portrays the controversies that rage today in the field of evolutionary biology. With a clear and unbiased eye, he explores the fundamental questions about the evolutionary process that have provoked such vehement disagreement among some of the world's most prominent scientists, including Stephen Jay Gould, fellow paleontologist Niles Eldredge, geneticist John Maynard Smith, and zoologist Richard Dawkins. A vibrant account of contemporary evolutionary biology, The Evolutionists is a fascinating look at how controversy and debate shape the scientific process.

How Science Works: Evolution Oxford University Press

Explores the development of the ideas of evolutionary biology, particularly as affected by the increasing understanding of genetics and of the chemical basis of inheritance.

Evolutionary Theory MIT Press

In this book the authors draw on what is known, largely from recent research, about the nature of genes and cells, the genetics of development and animal and plant body plans, intra- and interorganismal communication, sensation and perception, to propose that a few basic generalizations, along with the modified application of the classical evolutionary theory, can provide a broader theoretical understanding of genes, evolution, and the diverse and complex nature of living organisms.

The Evolution of Darwinism Hachette UK

Unifying Biology offers a historical reconstruction of one of the most important yet elusive episodes in the history of modern science: the evolutionary synthesis of the 1930s and 1940s. For more than seventy years after Darwin proposed his theory of evolution, it was hotly debated by biological scientists. It was not until the 1930s that opposing theories were finally refuted and a unified Darwinian evolutionary theory came to be widely accepted by biologists. Using methods gleaned from a variety of disciplines, Vassiliki Betty Smocovitis argues that the evolutionary synthesis was part of the larger process of unifying the biological sciences. At the same time that scientists were working toward a synthesis between Darwinian selection theory and modern genetics, they were, according to the author, also working together to establish an autonomous community of evolutionists. Smocovitis suggests that the drive to unify the sciences of evolution and biology was part of a global philosophical movement toward unifying knowledge. In developing her argument, she pays close attention to the problems inherent in writing the history of evolutionary science by offering historiographical reflections on the practice of history and the practice of science. Drawing from some of the most exciting recent approaches in science studies and cultural studies, she argues that science is a culture, complete with language, rituals, texts, and practices. Unifying Biology offers not only its own new synthesis of the history of modern evolution, but also a new way of "doing history."

Developmental Plasticity and Evolution Basic Books

A critique of selectionism and the proposal of an alternate theory of emergent evolution that is causally sufficient for evolutionary biology. Natural selection is commonly interpreted as the fundamental mechanism of evolution. Questions about how selection theory can claim to be the all-sufficient explanation of evolution often go unanswered by today's neo-Darwinists, perhaps for fear that any criticism of the evolutionary paradigm will encourage creationists and proponents of intelligent design. In Biological Emergences, Robert Reid argues that natural selection is not the cause of evolution. He writes that the causes of variations, which he refers to as natural experiments, are independent of natural selection; indeed, he suggests, natural selection may get in the way of evolution. Reid proposes an alternative theory to explain how emergent novelties are generated and under what conditions they can overcome the resistance of natural selection. He suggests that what causes innovative variation causes evolution, and that these phenomena are environmental as well as organismal. After an extended critique of selectionism, Reid constructs an emergence theory of evolution, first examining the evidence in three causal arenas of emergent evolution: symbiosis/association, evolutionary physiology/behavior, and developmental evolution. Based on this evidence of causation, he proposes some working hypotheses, examining mechanisms and processes common to all three arenas, and arrives at a theoretical framework that accounts for generative mechanisms and emergent qualities. Without selectionism, Reid argues, evolutionary innovation can more easily be integrated into a general thesis. Finally, Reid proposes a biological synthesis of rapid emergent evolutionary

phases and the prolonged, dynamically stable, non-evolutionary phases imposed by natural selection.

The Metaphysics of Evolution Cambridge University Press

proposes an approach to evolution that is more in harmony with modern science than Darwinism or neo-Darwinism

Beyond Natural Selection Princeton University Press

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, punctuation, 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 MIT Press

Darwin’s nineteenth-century writings laid the foundations for modern studies of evolution, and theoretical developments in the mid-twentieth century fostered the Modern Synthesis. Since that time, a great deal of new biological knowledge has been generated, including details of the genetic code, lateral gene transfer, and developmental constraints. Our improved understanding of these and many other phenomena have been working their way into evolutionary theory, changing it and improving its correspondence with evolution in nature. And while the study of evolution is thriving both as a basic science to understand the world and in its applications in agriculture, medicine, and public health, the broad scope of evolution—operating across genes, whole organisms, clades, and ecosystems—presents a significant challenge for researchers seeking to integrate abundant new data and content into a general theory of evolution. This book gives us that framework and synthesis for the twenty-first century. The Theory of Evolution presents a series of chapters by experts seeking this integration by addressing the current state of affairs across numerous fields within evolutionary biology, ranging from biogeography to multilevel selection, speciation, and macroevolutionary theory. By presenting current syntheses of evolution’s theoretical foundations and their growth in light of new datasets and analyses, this collection will enhance future research and understanding.

Biological Emergences Princeton University Press

Extending the human life-span past 120 years. The "green" revolution. Evolution and human psychology. These subjects make today's newspaper headlines. Yet much of the science underlying these topics stems from a book published nearly 140 years ago--Charles Darwin's On the Origin of Species. Far from an antique idea restricted to the nineteenth century, the theory of evolution is one of the most potent concepts in all of modern science. In Darwin's Spectre, Michael Rose provides the general reader with an introduction to the theory of evolution: its beginning with Darwin, its key concepts, and how it may affect us in the future. First comes a brief biographical sketch of Darwin. Next, Rose gives a primer on the three most important concepts in evolutionary theory--variation, selection, and adaptation. With a firm grasp of these concepts, the reader is ready to look at modern applications of evolutionary theory. Discussing agriculture, Rose shows how even before Darwin farmers and ranchers unknowingly experimented with evolution. Medical research, however, has ignored Darwin's lessons until recently, with potentially grave consequences. Finally, evolution supplies important new vantage points on human nature. If humans weren't created by deities, then our nature may be determined more by evolution than we have understood. Or it may not be. In this question, as in many others, the Darwinian perspective is one of the most important for understanding human affairs in the modern world. Darwin's Spectre explains how evolutionary biology has been used to support both valuable applied research, particularly in agriculture, and truly frightening objectives, such as Nazi eugenics. Darwin's legacy has been a comfort and a scourge. But it has never been irrelevant.

Rethinking Evolution: The Revolution That's Hiding In Plain Sight Springer Science & Business Media

This study provides a stimulating critique of contemporary evolutionary thought, analyzing the Modern Synthesis first developed by Theodosius Dobzhansky, Ernst Mayr, and George Gaylord Simpson. The author argues that although only genes and organisms are taken as historic "individuals" in conventional theory, species, higher taxa, and ecological entities such as populations and communities should also be construed as individuals--an approach that yields the ecological and genealogical hierarchies that interact to produce evolution. This clearly stated, controversial work will provoke much debate among evolutionary biologists, systematists, paleontologists, and ecologists, as well as a wide range of educated lay readers.

The Evolutionists Princeton University Press

Biology was forged into a single, coherent science only within living memory. In this volume the thinkers responsible for the "modern synthesis" of evolutionary biology and genetics come together to analyze that remarkable event. In a new Preface, Ernst Mayr calls attention to the fact that scientists in different biological disciplines varied considerably in their degree of acceptance of Darwin's theories. Mayr shows us that these differences were played out in four separate periods: 1859 to 1899, 1900 to 1915, 1916 to 1936, and 1937 to 1947. He thus enables us to understand fully why the synthesis was necessary and why Darwin's original theory--that evolutionary change is due to the combination of variation and selection--is as solid at the end of the twentieth century as it was in 1859.

Acquiring Genomes Race Point Publishing

There are many different types of organisms in the world: they differ in size, physiology, appearance, and life history. The challenge for evolutionary biology is to explain how such diversity arises. The Evolution of Life Histories does this by showing that natural selection is the principal underlying force molding life history variation. The book describes in particular the ways in which variation can be analyzed and predicted. It covers both the genetic and optimization approaches to

life history analysis and gives an overview of the general framework of life history theory and the mathematical tools by which predictions can be made and tested. Factors affecting the age schedule of birth and death and the costs of reproduction are discussed. The Evolution of Life Histories concentrates on those theoretical developments that have been tested experimentally. It will interest both students and professionals in evolution, evolutionary ecology, mathematical and theoretical biology, and zoology and entomology.

Holt Biology Chapter 16 Resource File: Evolutionary Theory SUNY Press

This 2004 book focuses on three issues of debate in Darwin's theory of evolution using a historical and philosophical perspective.