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Anthropology Human Evolution beyond Biology and Culture

Pillars of Evolution provides a fresh and provocative perspective on adaptive evolution. Readers new to the study of evolution will find a refreshing new insight that establishes evolutionary biology as a rigorous and predictive science, whilst practicing biologists will discover a provocative book that challenges traditional approaches. The book begins by leading readers through the mechanics of heredity, reproduction, movement, survival, and development. With that framework in place, it then explores the numerous ways that traits emerge from the interactions between genetics, development, and the environment. The key message is that adaptive changes in traits (and their underlying allelic frequencies) evolve through the traits' functions and their connection with fitness. The complex mappings from genes-to-traits-to-fitness are characterized in the structure of evolution. A single "structure matrix" describes why individuals vary in the values of adaptive traits, their ability to perform the function of those traits, and in the fitness they accrue. Fitness depends on how organisms interact with and perceive their environment in time and space. These relationships are made explicit in spatial, temporal, and organizational scale that also sets the stage for the crucially important role that ecology always plays in evolution. The ecological hallmarks of density- and frequency-dependent interactions allow the authors to explore new and exciting insights into evolution's dynamics. The theories and principles are then brought together in a final synthesis on adaptation. The book's unique approach unites genetic, development, and environmental influences into a single comprehensive treatment of the eco-evolutionary process.

Complex Organismal Functions:  
Integration and Evolution in Vertebrates D. B. Wake G. Roth

Editors The complexity of forms and functions of organisms studied in an evolutionary context prompts a fundamental question of modern biology: how did complex functional systems, apparently stabilized by high degrees of integration, evolve to their present diversity? This and related questions were discussed by 48 distinguished scientists from many fields of vertebrate biology, including functional and comparative morphologists, neurobiologists, reproductive biologists and endocrinologists, developmental biologists, ecologists, ethologists, population geneticists, and theorists, at a Dahlem Workshop. This volume is a report of that meeting. The major areas of discussion were: evolutionary diversification of feeding mechanisms; evolution of locomotor systems; trends in reproductive biology, especially the repeated evolution of vertebrate viviparity; and alternative and complementary concepts of the production of evolutionary novelties and patterns. These topics reflect the excitement and dynamism of current debate in evolutionary biology and constitute a cohesive point of departure for further research. This text presents theoretical background and case studies that demonstrate how evolutionary definitions of archaeological style and function may be applied to the prehistoric record.

Evolutionary Processes and Metaphors Edited by Mae-Wan Ho, Department of Biology, The Open University, UK

Sidney W. Fox, Institute for Molecular and Cellular Evolution, University of Miami, USA The current evolutionary debate encompasses protobiotic chemistry at one extreme and human sociobiology at the other.

Meanwhile, significant advances continue to be made in many scientific disciplines which have far-reaching implications on our view of nature. Although it is now

generally felt that neo-Darwinism, at least in its orthodox form, is no longer an adequate theory of evolution, very few attempts have yet been made to articulate a coherent alternative out of the many voices of dissent. The purpose of the present volume is two-fold: to work towards a new evolutionary synthesis which takes full account of contemporary knowledge in all disciplines; and to examine explicitly the metaphorical basis of evolutionary theories old and new, as this has a powerful impact on our humanistic perspectives which underpin all social and political actions. We have brought together representatives of two groups of workers: those who ultimately believe in working within a transformed neo-Darwinism, and others who advocate a more radical reorientation away from the orthodoxy. Despite their fundamentally different affiliations, they are nonetheless able to communicate on questions of evolutionary concepts and mechanisms and their wider relevance to science and society. New insights are presented on major issues such as the physicochemical underpinnings of life processes, the meaning of natural selection, the nature of variation, heredity and morphogenesis, the integration of organism and environment, the active role of the organism in evolution and the evolution of human society. The new synthesis which is emerging is an integrated, multilevel and multidisciplinary approach to evolution which accords not only with the state of present-day knowledge, but with our deepest experience of nature. Molecular anthropology uses molecular genetic methods to address questions and issues of anthropological interest. More specifically, molecular anthropology is concerned with genetic evidence concerning human origins, migrations, and population relationships,

including related topics such as the role of recent natural selection in human population differentiation, or the impact of particular social systems on patterns of human genetic variation. Organized into three major sections, An Introduction to Molecular Anthropology first covers the basics of genetics – what genes are, what they do, and how they do it – as well as how genes behave in populations and how evolution influences them. The following section provides an overview of the different kinds of genetic variation in humans, and how this variation is analyzed and used to make evolutionary inferences. The third section concludes with a presentation of the current state of genetic evidence for human origins, the spread of humans around the world, the role of selection and adaptation in human evolution, and the impact of culture on human genetic variation. A final, concluding chapter discusses various aspects of molecular anthropology in the genomics era, including personal ancestry testing and personal genomics. An Introduction to Molecular Anthropology is an invaluable resource for students studying human evolution, biological anthropology, or molecular anthropology, as well as a reference for anthropologists and anyone else interested in the genetic history of humans. Both natural and cultural selection played an important role in shaping human evolution. Since cultural change can itself be regarded as evolutionary, a process of gene-culture coevolution is operative. The study of human evolution - in past, present and future - is therefore not restricted to biology. An inclusive comprehension of human evolution relies on integrating insights about cultural, economic and technological evolution with relevant elements of evolutionary biology. In addition, proximate causes and

effects of cultures need to be added to the picture - issues which are at the forefront of social sciences like anthropology, economics, geography and innovation studies. This book highlights discussions on the many topics to which such generalised evolutionary thought has been applied: the arts, the brain, climate change, cooking, criminality, environmental problems, futurism, gender issues, group processes, humour, industrial dynamics, institutions, languages, medicine, music, psychology, public policy, religion, sex, sociality and sports. "This is MacLean's major work on the evolutionary development of the human brain. In its evolution the human forebrain expands along the lines of three basic formations that anatomical and biochemically reflect an ancestral relationship, respectively, to reptiles, early mammals, and late mammals. MacLean describes this as the Triune Brain."--Amazon.com viewed July 29, 2020 In Gene Sharing and Evolution Piatigorsky explores the generality and implications of gene sharing throughout evolution and argues that most if not all proteins perform a variety of functions in the same and in different species, and that this is a fundamental necessity for evolution. This book proposes a new way to think about evolution. The author carefully brings together evidence from diverse fields of science. In the process, he bridges the gaps between many different--and usually seen as conflicting--ideas to present one integrative theory named ONCE, which stands for Organic Nonoptimal Constrained Evolution. The author argues that evolution is mainly driven by the behavioral choices and persistence of organisms themselves, in a process in which Darwinian natural selection is mainly a secondary--but still crucial--evolutionary player. Within ONCE, evolution is

therefore generally made of mistakes and mismatches and trial-and-error situations, and is not a process where organisms engage in an incessant, suffocating struggle in which they can't thrive if they are not optimally adapted to their habitats and the external environment. Therefore, this unifying view incorporates a more comprehensive view of the diversity and complexity of life by stressing that organisms are not merely passive evolutionary players under the rule of external factors. This insightful and well-reasoned argument is based on numerous fascinating case studies from a wide range of organisms, including bacteria, plants, insects and diverse examples from the evolution of our own species. The book has an appeal to researchers, students, teachers, and those with an interest in the history and philosophy of science, as well as to the broader public, as it brings life back into biology by emphasizing that organisms, including humans, are the key active players in evolution and thus in the future of life on this wonderful planet. Biology has entered an era in which interdisciplinary cooperation is at an all-time high, practical applications follow basic discoveries more quickly than ever before, and new technologies – recombinant DNA, scanning tunneling microscopes, and more – are revolutionizing the way science is conducted. The potential for scientific breakthroughs with significant implications for society has never been greater. Opportunities in Biology reports on the state of the new biology, taking a detailed look at the disciplines of biology; examining the advances made in medicine, agriculture, and other fields; and pointing out promising research opportunities. Authored by an expert panel representing a variety of viewpoints, this volume also offers recommendations on how to meet the infrastructure

needs to be for funding, effective information systems, and other support of future biology research. Exploring what has been accomplished and what is on the horizon, *Opportunities in Biology* is an indispensable resource for students, teachers, and researchers in all subdisciplines of biology as well as for research administrators and those in funding agencies. These six original essays focus on a potentially important aspect of evolutionary biology, the possible causal role of phenotypic behavior in evolution. Balancing theory with actual or potential empiricism, they provide the first full examination of this topic. Plotkin's opening chapter outlines the "conceptual minefields" that the contributors attempt to negotiate: What is an adequate theory of evolution? What is behavior and is it possible to maintain a distinction between behavior and other attributes of the phenotype? Is behavior both a cause and a consequence of evolution? And what do the theoretical issues mean in empirical terms? He concludes that any attempt to understand the causal role of behavior in evolution requires a more complicated theoretical structure than that of orthodox neoDarwinism, a conceptualization of behavior as a distinctive set of phenotypic attributes, and the accumulation of more data. David L. Hull (Northwestern University) provides an alternative account of the evolutionary process by developing a hierarchy of replicators-interactors-lineages to replace the traditional one of genes-organisms-species. Robert N. Brandon (Duke University) also posits hierarchy as an appropriate architecture for the theoretical complexity needed to support an examination of the role of behavior in evolution. F. J. Odling-Smee (Brunei University) outlines a theoretical structure to encompass the behavior of



phenotypes, concentrating on the unrestricted definition of behavior (everything that an animal does). The remaining chapters are as much concerned with evidence as with theory. Plotkin concentrates on a restricted definition of behavior (behavior that is a product of choosing intelligence), reviewing our empirical knowledge of how learning might influence evolution. R.I.M. Dunbar (University College, London) uses empirical studies of vertebrate social behavior to deal with the question of how the social systems, especially of primates, might have a causal role in species evolution. Henry C. Plotkin is Lecturer at the University College, London. A Bradford Book. Evolution: Components and Mechanisms introduces the many recent discoveries and insights that have added to the discipline of organic evolution, and combines them with the key topics needed to gain a fundamental understanding of the mechanisms of evolution. Each chapter covers an important topic or factor pertinent to a modern understanding of evolutionary theory, allowing easy access to particular topics for either study or review. Many chapters are cross-referenced. Modern evolutionary theory has expanded significantly within only the past two to three decades. In recent times the definition of a gene has evolved, the definition of organic evolution itself is in need of some modification, the number of known mechanisms of evolutionary change has increased dramatically, and the emphasis placed on opportunity and contingency has increased. This book synthesizes these changes and presents many of the novel topics in evolutionary theory in an accessible and thorough format. This book is an ideal, up-to-date resource for biologists, geneticists, evolutionary biologists, developmental biologists, and researchers in, as

well as students and academics in these areas and professional scientists in many subfields of biology. Discusses many of the mechanisms responsible for evolutionary change Includes an appendix that provides a brief synopsis of these mechanisms with most discussed in greater detail in respective chapters Aids readers in their organization and understanding of the material by addressing the basic concepts and topics surrounding organic evolution Covers some topics not typically addressed, such as opportunity, contingency, symbiosis, and progress New Horizons in Evolution is a compendium of the latest research, analyses, and theories of evolutionary biology. Chapters are collected from the international symposium held by the Board of Governors of the University of Haifa to honor Dr. Eviatar Nevo, founder and director of the Institute of Evolution. This book includes material written by top global scientists. Such detailed summaries and recent advances include topics like genomics, epigenetics, evolutionary theory, and the evolution of cancer. This book analyzes evolutionary biology of animals, such as lizards and subterranean mammals. It also discusses agricultural evolution, specifically the vital wheat crop in various climates and locations. Each chapter contributes the most up-to-date knowledge of evolution ' s role in speciation, adaptation, and regulation. New Horizons in Evolution is a valuable resource for researchers involved in evolution, evolutionary biology, and evolutionary theory. Advanced undergraduate and graduate students in evolutionary biology courses will also find this useful due to the high expertise level and latest knowledge available through this resource. Examines the evolution of species in extreme conditions Discusses the role of evolution in

medicine and cancer research Features the latest data and advances in evolution theory The discovery and the investigation of restriction-modification enzymes have been having enormous impact on development of modern biology through applications of the recombinant DNA technology. In corresponding databases the number of potential proteins assigned to type II restriction enzymes alone is beyond 10 000, which probably reflects the high diversity of evolutionary pathways. Their classification includes many subtypes with highly varied properties. Type IIC organises bifunctional endonuclease-methyltransferase enzymes and currently consists of 12 described members. Here it is presented experimental evidence that a new type IIC restriction and modification enzymes carrying both activities in a single polypeptide could result from fusion of the appropriate genes from preexisting bipartite restriction-modification systems; and found 76 new potential bifunctional restriction-modification enzymes by computer analysis of genomic data. Finally, it is proposed a molecular mechanism of appearing of type IIC restriction-modification and M.SsoII-related enzymes, as well as other multifunctional proteins. This book is the first in a projected series on Evolutionary Cell Biology, the intent of which is to demonstrate the essential role of cellular mechanisms in transforming the genotype into the phenotype by transforming gene activity into evolutionary change in morphology. This book —Cells in Evolutionary Biology — evaluates the evolution of cells themselves and the role cells have been viewed to play as agents of change at other levels of biological organization. Chapters explore Darwin ' s use of cells in his theory of evolution and how Weismann ' s theory of the separation of germ plasm from body cells

brought cells to center stage in understanding how acquired changes to cells within generations are not passed on to future generations. The study of evolution through the analysis of cell lineages during embryonic development dominated evolutionary cell biology until usurped by the switch to genes as the agents of heredity in the first decades of the 20th century. Discovery that cells exchanged organelles via symbiosis led to a fundamental reevaluation of prokaryotic and eukaryotic cells and to a reorganizations of the Tree of Life. Identification of cellular signaling centers, of mechanisms responsible for cellular patterning, and of cell behavior and cellular condensations as mediating the plasticity that enables phenotypic change during evolution, provided powerful new synergies between cell biology and evolutionary theory and the basis for Evolutionary Cell Biology. Sequence - Evolution - Function is an introduction to the computational approaches that play a critical role in the emerging new branch of biology known as functional genomics. The book provides the reader with an understanding of the principles and approaches of functional genomics and of the potential and limitations of computational and experimental approaches to genome analysis. Sequence - Evolution - Function should help bridge the "digital divide" between biologists and computer scientists, allowing biologists to better grasp the peculiarities of the emerging field of Genome Biology and to learn how to benefit from the enormous amount of sequence data available in the public databases. The book is non-technical with respect to the computer methods for genome analysis and discusses these methods from the user's viewpoint, without addressing mathematical and algorithmic details. Prior practical familiarity with the basic methods for

sequence analysis is a major advantage, but a reader without such experience will be able to use the book as an introduction to these methods. This book is perfect for introductory level courses in computational methods for comparative and functional genomics. Since George Gaylord Simpson published *Tempo and Mode in Evolution* in 1944, discoveries in paleontology and genetics have abounded. This volume brings together the findings and insights of today's leading experts in the study of evolution, including Ayala, W. Ford Doolittle, and Stephen Jay Gould. The volume examines early cellular evolution, explores changes in the tempo of evolution between the Precambrian and Phanerozoic periods, and reconstructs the Cambrian evolutionary burst. Long-neglected despite Darwin's interest in it, species extinction is discussed in detail. Although the absence of data kept Simpson from exploring human evolution in his book, the current volume covers morphological and genetic changes in human populations, contradicting the popular claim that all modern humans descend from a single woman. This book discusses the role of molecular clocks, the results of evolution in 12 populations of *Escherichia coli* propagated for 10,000 generations, a physical map of *Drosophila* chromosomes, and evidence for "hitchhiking" by mutations. 'The Essential Tension' explores how agents that naturally compete come to act together as a group. The author argues that the controversial concept of multilevel selection is essential to biological evolution, a proposition set to stimulate new debate. The idea of one collective unit emerging from the cooperative interactions of its constituent (and mutually competitive) parts has its roots in the ancient world. More recently, it has illuminated studies of animal behavior, and

played a controversial role in evolutionary biology. In Part I, the author explores the historical development of the idea of a collectivity in biological systems, from early speculations on the sociology of human crowd behavior, through the mid-twentieth century debates over the role of group selection in evolution, to the notion of the selfish gene. Part II investigates the balance between competition and cooperation in a range of contemporary biological problems, from flocking and swarming to experimental evolution and the evolution of multicellularity. Part III addresses experimental studies of cooperation and competition, as well as controversial ideas such as the evolution of evolvability and Stephen Jay Gould's suggestion that "spandrels" at one level of selection serve as possible sources of variability for the next higher level. Finally, building on the foundation established in the preceding chapters, the author arrives at a provocative new proposition: as a result of the essential tension between competition and cooperation, multiple levels may be essential in order for evolutionary processes to occur at all.

A famed political scientist's classic argument for a more cooperative world We assume that, in a world ruled by natural selection, selfishness pays. So why cooperate? In *The Evolution of Cooperation*, political scientist Robert Axelrod seeks to answer this question. In 1980, he organized the famed Computer Prisoners Dilemma Tournament, which sought to find the optimal strategy for survival in a particular game. Over and over, the simplest strategy, a cooperative program called Tit for Tat, shut out the competition. In other words, cooperation, not unfettered competition, turns out to be our best chance for survival. A vital book for leaders and decision makers, *The Evolution of Cooperation* reveals how cooperative principles help us

think better about everything from military strategy, to political elections, to family dynamics. 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. In this field there has been an explosion of information generated by scientific research. One of the beneficiaries of this has been the study of morphology, where new techniques and analyses have led to insights into a wide range of topics. Advances in genetics, histology, microstructure, biomechanics and morphometrics have allowed researchers to view teeth from alternative perspectives. However, there has been little communication between researchers in the different fields of dental research. This book brings together overviews on a wide range of dental topics linking genes, molecules and developmental mechanisms within an evolutionary framework. Written by the leading experts in the field, this book will stimulate co-operative research in fields as diverse as paleontology, molecular biology, developmental biology and functional morphology. Brings together some of the top clinicians working within an evolutionary framework for the purpose of defining the new field of evolutionary psychotherapy and outlining new treatment approaches. Nature's Magic presents a bold vision of the evolutionary process from the Big Bang to the 21st



century. Synergy of various kinds is not only a ubiquitous aspect of the natural world but it has also been a wellspring of creativity and the 'driver' of the broad evolutionary trend toward increased complexity, in nature and human societies alike. But in contrast with the many theories of emergence or complexity that rely on some underlying force or 'law', the 'Synergism Hypothesis', as Peter Corning calls it, is in essence an economic theory of biological complexity; it is fully consistent with mainstream evolutionary biology. Corning refers to it as Holistic Darwinism. Among the many important insights that are provided by this new paradigm, Corning presents a scenario in which the human species invented itself; synergistic, behavioral and technological innovations were the 'pacemakers' of our biological evolution. Synergy has also been the key to the evolution of complex modern societies, he concludes. What comes first, form or function? Evolutionary developmental biology (or "evo-devo") answers this fundamental question by showing how evolution controls the development of organisms. Alessandro Minelli takes an in-depth and comprehensive look at the history and key issues of evo-devo, focusing on the innovative ways animal organisms evolve through competition and cooperation. Minelli provides a complete overview of conceptual developments--from the fierce nineteenth-century debates between the French biologists Geoffroy and Cuvier, who fought over questions of form versus function--to modern theories of how genes dictate body formation. The book's wide-ranging topics include expression patterns of genes, developmental bias, the role of developmental genes, and genetic determinism. Drawing from diverse examples, such as the anatomy of butterflies, giraffes, Siamese twins, and corals, Minelli extends and

reformulates important concepts from development, evolution, and the interplay between the two. In spite of the fact that parasites represent more than half of all living species of plants and animals, their role in the evolution of life on earth has been substantially underestimated. Here, for the first time within an evolutionary and ecological framework, Peter Price integrates the biological attributes that characterize parasites ranging from such diverse groups as viruses, bacteria, protozoa, and fungi, to helminths, mites, insects, and parasitic flowering plants. Synthesizing systematics, ecology, behavioral biology, genetics, and biogeography, the author outlines the success of parasitism as a mode of life, the common features of the wide range of organisms that adopt such a way of life, the reasons for parasites' extraordinary potential for continued adaptive radiation, and their role in molding community structure by means of their impact on the evolution of host species. In demonstrating the importance of parasitic interactions for determining population patterns and geographical distributions, Dr. Price generates further discussion and suggests new areas for research. Despite decades of work in evolutionary algorithms, there remains an uncertainty as to the relative benefits and detriments of using recombination or mutation. This book provides a characterization of the roles that recombination and mutation play in evolutionary algorithms. It integrates important prior work and introduces new theoretical techniques for studying evolutionary algorithms. Consequences of the theory are explored and a novel method for comparing search and optimization algorithms is introduced. The focus allows the book to bridge multiple communities, including evolutionary biologists and

population geneticists. *Modularity in Development and Evolution* offers the first sustained exploration of modules from developmental and evolutionary perspectives. Contributors discuss what modularity is, how it can be identified and modeled, how it originated and evolved, and its biological significance. Covering modules at levels ranging from genes to colonies, the book focuses on their roles not just in structures but also in processes such as gene regulation. Among many exciting findings, the contributors demonstrate how modules can highlight key constraints on evolutionary processes. A timely synthesis of a crucial topic, *Modularity in Development and Evolution* shows the invaluable insights modules can give into both developmental complexities and their evolutionary origins. The application of new molecular technology has greatly increased our understanding of the role of chromosomal change in plant evolution. There is now a broad database on genome size variation within and among species and a wide array of nuclear and cytoplasmic genetic markers. There is a variety of literatures addressing this subject but much of it is scattered. This book created a contemporary synthesis of work in this area and addresses issues such as heterogeneity, polyploidy, chromosomal rearrangements within species and phenotypic consequences of chromosome doubling. Less than 450 years ago, all European scholars believed that the earth was the centre of a universe that was at most a few million miles in extent, and that the planets, sun, and stars all rotated around this centre. Less than 250 years ago, they believed that the universe was created essentially in its present state about 6000 years ago. Less than 150 years ago, the special creation by God of living species was still dominant. The relentless application

of the scientific method of inference from experiment and observation, without reference to religious, or governmental authority has completely transformed our view of our origins and relation to the universe, in less than 500 years. Few would dispute that this programme has been spectacularly successful, particularly in the twentieth century. This book is about the crucial role of evolutionary biology in transforming our view of human origins and relation to the universe, and the impact of this idea on traditional philosophy and religion. The purpose of this book is to introduce the general reader to some of the most important basic findings, concepts, and procedures of evolutionary biology, as it has developed since the first publications of Darwin and Wallace on the subject, over 140 years ago. Evolution provides a unifying set of principals for the whole of biology; it also illuminates the relation of human beings to the universe and each other. In addition, many aspects of evolution have practical importance; for instance, the rapid evolution of resistance by bacteria to antibiotics and of HIV to antiviral drugs are pressing medical problems. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable. The Logic of Chance offers a reappraisal and a new synthesis of theories, concepts, and hypotheses on the key aspects of the evolution of life on earth in light of comparative genomics and systems biology. The author presents many specific examples from systems and comparative genomic

analysis to begin to build a new, much more detailed, complex, and realistic picture of evolution. The book examines a broad range of topics in evolutionary biology including the inadequacy of natural selection and adaptation as the only or even the main mode of evolution; the key role of horizontal gene transfer in evolution and the consequent overhaul of the Tree of Life concept; the central, underappreciated evolutionary importance of viruses; the origin of eukaryotes as a result of endosymbiosis; the concomitant origin of cells and viruses on the primordial earth; universal dependences between genomic and molecular-phenomic variables; and the evolving landscape of constraints that shape the evolution of genomes and molecular phenomes. "Koonin's account of viral and pre-eukaryotic evolution is undoubtedly up-to-date. His "mega views" of evolution (given what was said above) and his cosmological musings, on the other hand, are interesting reading." Summing Up: Recommended Reprinted with permission from CHOICE, copyright by the American Library Association. Spanning evolutionary science from its inception to its latest findings, from discoveries and data to philosophy and history, this book is the most complete, authoritative, and inviting one-volume introduction to evolutionary biology available. Clear, informative, and comprehensive in scope, Evolution opens with a series of major essays dealing with the history and philosophy of evolutionary biology, with major empirical and theoretical questions in the science, from speciation to adaptation, from paleontology to evolutionary development (evo devo), and concluding with essays on the social and political significance of evolutionary biology today. A second encyclopedic section travels the spectrum of topics in

evolution with concise, informative, and accessible entries on individuals from Aristotle and Linnaeus to Louis Leakey and Jean Lamarck; from T. H. Huxley and E. O. Wilson to Joseph Felsenstein and Motoo Kimura; and on subjects from altruism and amphibians to evolutionary psychology and Piltdown Man to the Scopes trial and social Darwinism. Readers will find the latest word on the history and philosophy of evolution, the nuances of the science itself, and the intricate interplay among evolutionary study, religion, philosophy, and society. Appearing at the beginning of the Darwin Year of 2009—the 200th anniversary of the birth of Charles Darwin and the 150th anniversary of the publication of the *Origin of Species*—this volume is a fitting tribute to the science Darwin set in motion. After a brief survey of the perception of morphological change in the standard works of the Hispanic tradition in the 20th century, the author first attempts to refine concepts such as analogy, leveling, blending, contamination, etc. as they have been applied to Spanish. He then revisits difficult problems of Spanish historical grammar and explores the extent to which various types of morphological processes may have operated in a given change. Selected problems are examined in light of abundant textual evidence. Some include: the resistance to change of Sp. *dormir* ‘to sleep’, *morir* ‘to die’, the vocalic sequence /ee/, the reduction of the OSp. verbal suffixes -ades, -edes, -ides, -odes, and the uncertain origin of Sp. *eres* ‘you are’. Important notions such as the directionality of leveling, phonological vs. morphological change in the nominal and verbal paradigms, the morphological spread of sound change, and the role of morphological factors in apparent syntactic change are discussed. This illuminating volume explores the effects of

chance on evolution, covering diverse perspectives from scientists, philosophers, and historians. The evolution of species, from single-celled organisms to multicellular animals and plants, is the result of a long and highly chancy history. But how profoundly has chance shaped life on earth? And what, precisely, do we mean by chance? Bringing together biologists, philosophers of science, and historians of science, *Chance in Evolution* is the first book to untangle the far-reaching effects of chance, contingency, and randomness on the evolution of life. The book begins by placing chance in historical context, starting with the ancients and moving through Darwin to contemporary biology. It documents the shifts in our understanding of chance as Darwin's theory of evolution developed into the modern synthesis, and how the acceptance of chance in Darwinian theory affected theological resistance to it. Other chapters discuss how chance relates to the concepts of genetic drift, mutation, and parallel evolution—as well as recent work in paleobiology and the experimental evolution of microbes. By engaging in collaboration across biology, history, philosophy, and theology, this book offers a comprehensive overview both of the history of chance in evolution and of our current understanding of the impact of chance on life. In this book Ron Amundson examines two hundred years of scientific views on the evolution-development relationship from the perspective of evolutionary developmental biology (evo-devo). This perspective challenges several popular views about the history of evolutionary thought by claiming that many earlier authors had made history come out right for the Evolutionary Synthesis. The book starts with a revised history of nineteenth-century evolutionary thought. It then

investigates how development became irrelevant with the Evolutionary Synthesis. It concludes with an examination of the contrasts that persist between mainstream evolutionary theory and evo-devo. This book will appeal to students and professionals in the philosophy and history of science, and biology. This book contests the general view that natural selection constitutes the explanatory core of evolutionary biology. It invites the reader to consider an alternative view which favors a more complete and multidimensional interpretation. It is common to present the 1930-1960 period as characterized by the rise of the Modern Synthesis, an event structured around two main explanatory commitments: (1) Gradual evolution is explained by small genetic changes (variations) oriented by natural selection, a process leading to adaptation; (2) Evolutionary trends and speciation events are macroevolutionary phenomena that can be accounted for solely in terms of the extension of processes and mechanisms occurring at the previous microevolutionary level. On this view, natural selection holds a central explanatory role in evolutionary theory - one that presumably reaches back to Charles Darwin's *Origin of Species* - a view also accompanied by the belief that the field of evolutionary biology is organized around a profound divide: theories relying on strong selective factors and those appealing only to weak ones. If one reads the new analyses presented in this volume by biologists, historians and philosophers, this divide seems to be collapsing at a rapid pace, opening an era dedicated to the search for a new paradigm for the development of evolutionary biology. Contrary to popular belief, scholars' position on natural selection is not in itself a significant discriminatory factor between most evolutionists. In fact, the intellectual space is



quite limited, if not non-existent, between, on the one hand, "Darwinists", who play down the central role of natural selection in evolutionary explanations, and, on the other hand, "non-Darwinists", who use it in a list of other evolutionary mechanisms. The "mechanism-centered" approach to evolutionary biology is too incomplete to fully make sense of its development. In this book the labels created under the traditional historiography - "Darwinian Revolution", "Eclipse of Darwinism", "Modern Synthesis", "Post-Synthetic Developments" - are thus re-evaluated. This book will not only appeal to researchers working in evolutionary biology, but also to historians and philosophers."

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