The Major Transitions In Evolution

In this fascinating book, John Maynard Smith and Eors Szathmary present an original picture of evolution. They propose that during evolution there have been a number of major transitions in the way in which information is passed between generations. These transitions include the appearance of the first replicating molecules, the emergence of co-operative animal societies, and the unique language ability of humans. Containing many new ideas, this book is contemporary biology on the grandest scale, from the birth of life to the origin of language.

We define information in living systems as a reproducible and versatile catalyst. We argue that a key dimension for the evolution of information and the understanding of life is informactivity, a measure of the contribution to fitness of information. We then move to a clarification of information processing characteristics. We organise these characteristics into three sets related to content-holding, interfacing and transferring processes. We argue that evolution can play with mobility and interoperability of information which are aggregates of first order characteristics. We also argue that a better understanding of how these processes evolve will lead to a better and more exhaustive perception of

major transitions in evolution. We then exemplify how in certain "procooperative" environments interoperability can co-evolve with cooperative behaviours. We argue that a Red Queen process can affect interoperability of information related to public good production. In specific conditions this may allow to maintain cooperation in a population. At last, we discuss how science and education in human culture can be understood within the theoretical framework that has been proposed.

This book presents a unified evolutionary framework based on three sets of metaphors that will help to consolidate discussions on evolutionary transitions. Evolution is the unifying principle of life, making identifying ways to apply evolutionary principles to tackle existence-threatening crises such as climate change crucial. A more cohesive evolutionary framework will further the discussions in this regard and also accelerate the process itself. This book lays out a framework based on three dualistic classes of metaphors – time, space, and conflict resolution. Evolutionary transitions theory shows how metaphors can help us understand selective diversification, as Darwin described with his “tree of life”. Moreover, the recently proposed Stockholm paradigm demonstrates how metaphors can help shed light on the emergence of complex ecosystems that Darwin highlighted with his “tangled bank” metaphor. Taken together, these

ideas offer proactive measures for coping with existential crises for humanity, such as climate change. The book will appeal to biologists, philosophers and historians alike.

Does natural selection act primarily on individual organisms, on groups, on genes, or on whole species? Samir Okasha provides a comprehensive analysis of the debate in evolutionary biology over the levels of selection, focusing on conceptual, philosophical and foundational questions. A systematic framework is developed for thinking about natural selection acting at multiple levels of the biological hierarchy; the framework is then used to help resolve outstanding issues. Considerable attention is paid to the concept of causality as it relates to the levels of selection, in particular the idea that natural selection at one hierarchical level can have effects that 'filter' up or down to other levels. Unlike previous work in this area by philosophers of science, full account is taken of the recent biological literature on 'major evolutionary transitions' and the recent resurgence of interest in multi-level selection theory among biologists. Other biological topics discussed include Price's equation, kin and group selection, the gene's eye view, evolutionary game theory, outlaws and selfish genetic elements, species and clade selection, and the evolution of individuality. Philosophical topics discussed include reductionism and holism, causation and correlation, the

nature of hierarchical organization, and realism and pluralism.
During evolution, there have been several major changes in the way that genetic information is organized and transmitted from one generation to the next. These transitions include the origin of life itself, the first eukaryotic cells, reproduction by sexual means, the appearance ofmulticellular plants and animals, the emergence of cooperation and of animal societies, and the unique language ability of humans. This is the first book to discuss all of these major transitions. In discussing such a wide range of topics in one volume, the authors are able to highlight thesimilarities between different transitions - for example, between the union of replicating molecules to form chromosomes and of cells to form multicellular organisms. The authors also show how an understanding of one transition sheds light on others. A common theme in the book is that entities thatcould replicate independently before the transition can replicate afterwards only as part of a larger whole. Why, then, does selection between entities at the lower level not disrupt selection at the higher level? In answering this question, the authors offer an explanation for the evolution ofcooperation at all levels of complexity. Written in a clear style, and illustrated with many original diagrams, this book can be read with enjoyment by anyone with an undergraduate training in the biological sciences. It will be ideal for advanced discussion groups on

evolution. Although thecontent ranges widely from molecular biology to linguistics and from intragenomic conflict to insect societies, no detailed knowledge of any of these topics is required. Mathematical models are clearly explained, and equations and formulae are kept to a minimum.

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.

New discoveries of ancient vertebrates, filling in gaps in the fossil record, are quickly eroding the traditionally recognized differences between the principal groups of vertebrates—for

example, between dinosaurs and birds—and radically changing our understanding of the evolutionary history of the major group of animals to which our species belongs. This book describes this changing scientific landscape and contributes to the revolution in our knowledge of the developmental mechanisms that underlie evolutionary transformation.

The focus of this thesis is on the study of reproduction strategy in the context of evolutionary and social-evolutionary theory. Much of the hierarchical structure that is evident in the natural world is due to major evolutionary transitions where individual subunits that once reproduced individually now reproduce only as part of a larger unit. Modelling and understanding the processes behind the evolution of this hierarchy can have applications in both biology and computer science. I argue that to explain the major transitions it is necessary to understand why an individual would reduce its reproductive success to invest instead in a higher reproductive process (i.e., reproduce collectively with other individuals). To address this problem, a method for studying reproduction strategy was developed and is presented in this thesis. The method takes an abstract physiological approach to reproduction. It considers an individual as a quantity of resources and set of genes which define its reproduction strategy. I then investigate the advantages of different reproduction strategies and identify which strategies may dominate others. The strategies considered in my investigations include: an individual reproducing on its own; an individual gambling its total resources against those of multiple other individuals; or an individual sharing its reproductive effort with a partner or several other partners. Starting with individual reproduction, I simply study why an individual might reduce its reproductive rate when, on the face of it, it seems that maximum fecundity should be the best option. The model is also motivated in light of current literature on life

history and microbial ecology in particular. The results show how it can be advantageous for an individual to hedge its bets and delay reproduction; waiting instead until it has accumulated more resources and is less vulnerable to harsh periods. The results make predictions that are experimentally verifiable. Given the model of individual reproduction, I reapply the growth equations to question whether there is any advantage to sharing reproductive effort through collective reproduction. This model also shows that it can pay to hedge one's bets and invest in the less vulnerable, but slower, collective reproductive strategy. The results show that there is a mathematical relationship between the number of parents and the up-front cost of reproduction spent on creating a new offspring - depending on the extra cost per parent, two parents may be the best strategy or perhaps many parents. Looking in more detail at the transition from unicellular organisms to multicellular organisms, I model the macrocyst stage in the slime mould Dictyostelium. I consider how the macrocyst stage may be an early example of collective reproduction in protozoa. Here individuals aggregate to be ingested by a central cell which produces homogeneous offspring. I assume that each individual is gambling on being the central cell and the model presented reveals under what conditions this is likely to be a good strategy when compared to individual reproduction. Again, the results show that there is an advantage to hedging one's bets and investing in the macrocyst rather than going it alone. Finally I consider the origin of sexual reproduction in more detail. The traditional approach argues that the slower growth rate of sexually reproducing organisms means that there is a paradox concerning the origins and maintenance of sexual reproduction, especially when one considers males which do not contribute to their offspring. Extending the previous model of collective reproduction, I consider how many resources selfish individuals may contribute to

their offspring. The results show that there is a lower bound to the resources individuals may contribute and that when there is a high amplitude of resource fluctuation, the sexual strategy can dominate an asexual strategy. As well as the main body of work on the topic of individual reproduction, some further background work is also presented. The models use both mathematical and computer simulation models. These two approaches are compared and contrasted with reference to their value in generating good scientific explanations of the sorts of phenomena found in the types of systems I am studying.

Essays from a range of disciplinary perspectives show the central role that cooperation plays in structuring our world. This collection reports on the latest research on an increasingly pivotal issue for evolutionary biology: cooperation. The chapters are written from a variety of disciplinary perspectives and utilize research tools that range from empirical survey to conceptual modeling, reflecting the rich diversity of work in the field. They explore a wide taxonomic range, concentrating on bacteria, social insects, and, especially, humans. Part I ("Agents and Environments") investigates the connections of social cooperation in social organizations to the conditions that make cooperation profitable and stable, focusing on the interactions of agent, population, and environment. Part II ("Agents and Mechanisms") focuses on how proximate mechanisms emerge and operate in the evolutionary process and how they shape evolutionary trajectories. Throughout the book, certain themes emerge that demonstrate the ubiquity of questions regarding cooperation in evolutionary biology: the generation and division of the profits of cooperation; transitions in individuality; levels of selection, from gene to organism; and the "human cooperation explosion" that makes our own social behavior particularly puzzling from an evolutionary perspective.

This new text provides an integrated view of the forces that influence the patterns and rates of vertebrate evolution from the level of living populations and species to those that resulted in the origin of the major vertebrate groups. The evolutionary roles of behavior, development, continental drift, and mass extinctions are compared with the importance of variation and natural selection that were emphasized by Darwin. It is extensively illustrated, showing major transitions between fish and amphibians, dinosaurs and birds, and land mammals to whales. No book since Simpson's Major Features of Evolution has attempted such a broad study of the patterns and forces of evolutionary change. Undergraduate students taking a general or advanced course on evolution, and graduate students and professionals in evolutionary biology and paleontology will find the book of great interest.

This book is divided in two parts, the first of which shows how, beyond paleontology and systematics, macroevolutionary theories apply key insights from ecology and biogeography, developmental biology, biophysics, molecular phylogenetics and even the sociocultural sciences to explain evolution in deep time. In the second part, the phenomenon of macroevolution is examined with the help of real life-history case studies on the evolution of eukaryotic sex, the formation of anatomical form and body-plans, extinction and speciation events of marine invertebrates, hominin evolution and species conservation ethics. The book brings together leading experts, who explain pivotal concepts such as Punctuated Equilibria, Stasis, Developmental Constraints, Adaptive Radiations, Habitat Tracking, Turnovers, (Mass) Extinctions, Species Sorting, Major Transitions, Trends and Hierarchies – key premises that allow macroevolutionary epistemic frameworks to transcend microevolutionary theories that focus on genetic variation, selection, migration and fitness. Along the way, the contributing

authors review ongoing debates and current scientific challenges; detail new and fascinating scientific tools and techniques that allow us to cross the classic borders between disciplines; demonstrate how their theories make it possible to extend the Modern Synthesis; present guidelines on how the macroevolutionary field could be further developed; and provide a rich view of just how it was that life evolved across time and space. In short, this book is a must-read for active scholars and because the technical aspects are fully explained, it is also accessible for non-specialists. Understanding evolution requires a solid grasp of above-population phenomena. Species are real biological individuals and abiotic factors impact the future course of evolution. Beyond observation, when the explanation of macroevolution is the goal, we need both evidence and theory that enable us to explain and interpret how life evolves at the grand scale.

Field experiments show that the invasion a self-compatibility mutation in Leavenworthia alabamica is generally inhibited by strong inbreeding depression and seed discounting. It is only when these costs are temporarily reduced or when mate limitation becomes periodically intense that selfing is favored. However, capturing these kinds of rare, transient events can be exceedingly difficult in nature. Using computational models, we examined two of the major transitions thought to facilitate the evolution of selfing. First, polyploidy has been thought to have profound consequences on inbreeding depression. Using an individual based model, we show that the bottleneck associated with the formation of newly polyploid lineages provides one of the most permissive conditions for the spread of selfing. Second, a similar model shows that the reduction in inbreeding depression and enhanced mate limitation imposed by long distance colonization shapes patterns of breeding systems on islands. Overall, these results

suggest that transient, non-equilibrium conditions likely play a vital role in the evolution of breeding systems in flowering plants.

This volume describes features of autonomy and integrates them into the recent discussion of factors in evolution. In recent years ideas about major transitions in evolution are undergoing a revolutionary change. They include questions about the origin of evolutionary innovation, their genetic and epigenetic background, the role of the phenotype and of changes in ontogenetic pathways. In the present book, it is argued that it is likewise necessary to question the properties of these innovations and what was qualitatively generated during the macroevolutionary transitions. The author states that a recurring central aspect of macroevolutionary innovations is an increase in individual organismal autonomy whereby it is emancipated from the environment with changes in its capacity for flexibility, self-regulation and self-control of behavior. The first chapters define the concept of autonomy and examine its history and its epistemological context. Later chapters demonstrate how changes in autonomy took place during the major evolutionary transitions and investigate the generation of organs and physiological systems. They synthesize material from various disciplines including zoology, comparative physiology, morphology, molecular biology, neurobiology and ethology. It is argued that the concept is also relevant for understanding the relation of the biological evolution of man to his cultural abilities. Finally the relation of autonomy to adaptation, niche construction, phenotypic plasticity and other factors and patterns in evolution is discussed. The text has a clear perspective from the context of systems biology, arguing that the generation of biological autonomy must be interpreted within an integrative systems approach.

Drawing on recent advances in evolutionary biology, prominent scholars return to the question

posed in a pathbreaking book: how evolution itself evolved. In 1995, John Maynard Smith and Eörs Szathmáry published their influential book The Major Transitions in Evolution. The "transitions" that Maynard Smith and Szathmáry chose to describe all constituted major changes in the kinds of organisms that existed but, most important, these events also transformed the evolutionary process itself. The evolution of new levels of biological organization, such as chromosomes, cells, multicelled organisms, and complex social groups radically changed the kinds of individuals natural selection could act upon. Many of these events also produced revolutionary changes in the process of inheritance, by expanding the range and fidelity of transmission, establishing new inheritance channels, and developing more open-ended sources of variation. Maynard Smith and Szathmáry had planned a major revision of their work, but the death of Maynard Smith in 2004 prevented this. In this volume, prominent scholars (including Szathmáry himself) reconsider and extend the earlier book's themes in light of recent developments in evolutionary biology. The contributors discuss different frameworks for understanding macroevolution, prokaryote evolution (the study of which has been aided by developments in molecular biology), and the complex evolution of multicellularity.

"Nothing about the evolution of biological complexity makes sense except in the light of synergy." Peter Corning's new book is being hailed as a major contribution to what is perhaps the greatest shift in our understanding of evolution since The Origin of Species. It's a tour de force that takes us on a synergy-guided tour of the history of life. As Corning puts it, "life on Earth has been a synergistic phenomenon from the get go." Corning also shows how synergy has been a key to human evolution, including the rise of complex modern societies. "Cooperation may have been the vehicle, but synergy was the driver." As we now face a

tipping point and another major transition in evolution, Corning offers us a synergy-based road-map to the future. "One of the great take-home lessons from the epic of evolution is that cooperation produces synergy, and synergy is the way forward. The arc of evolution bends toward synergy." Contents: Explaining Complexity A New View of Evolution How Cooperation Trumps Competition Evolution as a "Combination of Labor" A Tale of Two Theories The Major Transitions in Evolution The Self-Made Man I: Australopithecine Entrepreneurs The Self-Made Man II: From erectus to Homo sapiens The Rise of Complex Societies The Next Major Transition Readership: Undergraduate, graduate students and the general public interested in general science, general life sciences, evolutionary biology, human biology/anthropology/primatology, and public policy. Keywords: Synergy;Cooperation;Complexity;Evolution;Natural Selection;Human Evolution;Major Transitions in Evolution;Cultural Evolution;Multi-Level SelectionReview: "This magnificent book reveals the critical role of synergy in evolution and in all of biology, including especially in humankind. Synergy is fundamental in so many areas of science and knowledge. And in his final chapter, on how to change our current dysfunctional course as a species and avoid the destruction of our planet, Peter Corning offers us a unique and hopeful new vision." Anthony Trewavas, FRS Emeritus Professor, Institute of Molecular Plant Science, University of Edinburgh and author of Plant Behaviour and Intelligence "Peter Corning's approach is wise and he is astonishingly well read. The scope of his excellent book is broad and ambitious, running from the origins of life to modern economics in human societies. Many of his examples are described in clear and fascinating detail ... He writes extremely well and I read every word with great pleasure and interest ... I am full of admiration and strongly recommend it." Sir

Patrick Bateson, FRS Emeritus Professor of Biology, Cambridge University president of the Zoological Society of London and the author of (among others) Behaviour, Development and Evolution "This is an important book. It offers a solution to a problem that has been central to evolutionary biology for half a century, with implications that reach down to the foundations of evolutionary theory. Corning argues that the huge and disproportionate advantages that arise when labor is combined could account for the rise of ever higher levels of organization in the history of life. The book is also well written, a pleasure to read." Daniel W McShea Professor of Biology, Duke University and co-author of Biology's First Law "Peter Corning's book is a marvelous addition to the growing literature about the emerging alternative to gene-centric neo-Darwinism in evolutionary biology. We would not exist were it not for the cooperative behaviour of livin

A major new textbook. A concise and clear introduction to evolutionary biology. This book introduces what is essential and exciting in evolutionary biology. It covers whole field and emphasises the important concepts for the student. Care has been taken to express complex and stimulating ideas in simple language, while the frequent examples and running summaries make readingfun. Its logical structure means that it can be read straight through, one chapter per sitting. * Concise, clear, and states what is important * Concentrates on the central concepts and illustrates them with telling examples * Running summaries in the margins make navigation easy * Suitable for a one-year or one-semester course in evolution * Summaries at chapter ends * Each chapter's links to neighbouring chapters are explained Evolution: an introduction takes a fresh approach to classical topics such as population genetics and natural selection, and gives an overview of recent advances in hot areas such as sexual selection,

genetic conflict, life history evolution, and phenotypic plasticity. Detail of contents The Prologue is unique and uniquely motivating. It makes four central points about evolution in the form of four case studies told as brief stories. Chapters 1-3 describe natural selection and the essential difference between adaptive and neutral evolution with unmatched clarity and simplicity. Chapter 4 emphasizes the essential message of population genetics without burdening the students with any of the unessential details and places unique emphasis on the role of the genetic system in constraining the response to selection. Chapter 6 is not found in any other evolution textbook, although there are a number of recent books on the subject, and it therefore provides an introductory overview of a topic that has been the object of much recent interest and promises to generate much more insight: the expression of geneticvariation analysed with the concept of reaction norms. Chapters 7-9 cover sex, life histories, and sexual selection in greater depth than they are dealt with in any other introductory textbook but without introducing advanced technical language and analysis. Chapters 6-9 thus give unprecedented coverage to phenotypic evolution in an introductory text. Chapter 10 on multilevel selection and genetic conflict is unique in introductory textbooks. Rolf Hoekstra has achieved a wonder of clarity and concision on the essentials of this exciting topic. Chapters 11 and 12 on speciation and systematics are, by comparison, pretty standard, but they continue the policy of clarity and concision with the focus on essentials. Chapter 13 on the history of the planet and of life is a completely new approach unabashedly designed to motivate students to think about deep time, geology, paleontology, and fossils. Chapter 14 on the major transitions in evolution is also not found in any other introductory textbook. It documents the conceptual issues raised in the history of life briefly and in a form that will stimulate the gifted. Chapter 15 profiles the chief

insights made possible by molecular systematics in the form of four case studies ranging from deep time to recent European history. It has standard content but unique structure. A strong point is the way mitochondrial Eve is contrasted with transpecies polymorphismto show students how to think about inferences with molecular evidence. Chapter 16 briefly presents the principle comparative methods and the kinds of insights that can be achieved with them. It is not unique - Ridley covers this ground well - but the examples used are new and the essential features of the methods - including potential pitfalls - are quite clearlydescribed. Chapter 17 places evolutionary thought into the context both of the natural sciences and of society at large.

Please note that the content of this book primarily consists of articles available from Wikipedia or other free sources online. Commentary (books not included). Pages: 68. Chapters: On the Origin of Species, The Selfish Gene, The Blind Watchmaker, The Beak of the Finch, The Extended Phenotype, Dawkins vs. Gould, The Origin of Birds, The Descent of Man, The Variation of Animals and Plants under Domestication, River Out of Eden, Man After Man: An Anthropology of the Future, The Future Is Wild, The Greatest Show on Earth: The Evidence for Evolution, The Structure of Evolutionary Theory, After Man: A Zoology of the Future, Sperm Wars, The Genetical Theory of Natural Selection, Adaptation and Natural Selection, Sociobiology: The New Synthesis, Wonderful Life, Only A Theory, Tempo and Mode in Evolution, Mutual Aid: A Factor of Evolution, The Major Transitions in Evolution, The Blood of the Nation, Variation and Evolution in Plants, Future Evolution, Evolution and the Theory of Games, The Origins of Virtue, Moral Minds, Climbing Mount Improbable, The Red Queen: Sex and the Evolution of Human Nature, Power, Sex, Suicide: Mitochondria and the Meaning of

Life, Evolution: The Modern Synthesis, Facts and Arguments for Darwin, The Theory of Evolution, Systematics and the Origin of Species, Genetics and the Origin of Species, The Neutral Theory of Molecular Evolution, Darwinian Fairytales, Melanism: Evolution in Action, The Causes of Evolution, The New Dinosaurs: An Alternative Evolution, Group Selection, The Evolution of Melanism, Flowering Plants: Evolution Above the Species Level.

The first volume to address the study of evolutionary transitions in plants, Major Evolutionary Transitions in Flowering Plant Reproduction brings together compelling work from the three areas of significant innovation in plant biology: evolution and adaptation in flowers and pollination, mating patterns and gender strategies, and asexual reproduction and polyploidy. Spencer C. H. Barrett assembles here a distinguished group of authors who address evolutionary transitions using comparative and phylogenetic approaches, the tools of genomics, population genetics, and theoretical modeling, and through studies in development and field experiments in ecology. With special focus on evolutionary transitions and shifts in reproductive characters—key elements of biological diversification and research in evolutionary biology—Major Evolutionary Transitions in Flowering Plant Reproduction is the most up-to-date treatment of a fast-moving area of evolutionary biology and ecology.

Is life a purely physical process? What is human nature? Which of our traits is essential to us? In this volume, Daniel McShea and Alex Rosenberg – a biologist and a philosopher, respectively – join forces to create a new gateway to the philosophy of biology; making the major issues accessible and relevant to biologists and philosophers alike. Exploring concepts such as supervenience; the controversies about genocentrism

and genetic determinism; and the debate about major transitions central to contemporary thinking about macroevolution; the authors lay out the broad terms in which we should assess the impact of biology on human capacities, social institutions and ethical values.

This book concerns branching patterns, including new principles for explaining the conditions under which branching patterns emerge. Moreover, the strategy of comparing populations of clones to natural populations may have applications and uses across scientific disciplines and sub-fields, in addition to being a way of generating new predictions related to biological phenomena and biological systems, or across political science and organizational variation. That is, computer scientists, mathematicians, and scientists from various fields have been doing simulations of branching patterns since the mid-20th century; however, it has not been recognized that comparing populations of clones to natural populations or random samples of natural populations is a way to collapse the distribution of characteristics or branching patterns of the natural populations. As suggested in the book, comparing populations of clones to natural populations is a strategy for identifying and visualizing branching patterns across scientific disciplines.

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.

During evolution there have been several major changes in the way genetic information is organized and transmitted from one generation to the next. These transitions include the origin of life itself, the first eukaryotic cells, reproduction by sexual means, the appearance of multicellular plants and animals, the emergence of cooperation and of animal societies. This is the first book to discuss all these major transitions and their implications for our understanding of evolution.Clearly written and illustrated with many

original diagrams, this book will be welcomed by students and researchers in the fields of evolutionary biology, ecology, and genetics.

The Major Transitions in EvolutionOxford University Press

'Gaining control' tells the story of how human behavioral capacities evolved from those of other animal species. Exploring what is known about the psychological capacities of other groups of animals, the authors reconstruct a fascinating history of our own mental evolution. In the book, the authors see mental evolution as a series of steps in which new mechanisms for controlling behavior develop in different species - starting with early representatives of this kingdom, and leading to a species - us - that can engage in a large number of different types of behavioral control. Key to their argument is the idea that each of these steps — from reflexes to instincts, drives, emotions, and cognitive planning - can be seen as a novel type of psychological adaptation in which information is 'inherited' by an animal from its own behavior through new forms of learning - a form of major evolutionary transition. Thus the mechanisms that result from these steps in increasingly complex behavioral control can also be seen as the fundamental building blocks of psychology. Such a perspective on behaviour has a number of implications for practitioners in fields ranging from experimental psychology to public health. Short, provocative, and insightful, this book will be of great interest and use to evolutionary psychologists and biologists, anthropologists and the scientific community as a whole.

Social behavior occurs in some of the smallest animals as well as some the

largest, and the transition from solitary life to sociality is an unsolved evolutionary mystery. In The Evolution of Social Wasps, James H. Hunt examines social behavior in a single lineage of insects, wasps of the family Vespidae. He presents empirical knowledge of social wasps from two approaches, one that focuses on phylogeny and life history and one that focuses on individual ontogeny, colony development, and population dynamics. He also provides an extensive summary of the existing literature while demonstrating how it can be clouded by theory. Hunt's fresh approach to the conflicting literature on sociality highlights how oft repeated models can become fixed in the thinking of the scientific community. Instead, Hunt presents a mechanistic scenario for the evolution of sociality in wasps that changes our perspective on kin selection, the paradigm that has dominated thinking about social evolution since the 1970s. This innovative new model integrates life history, nutrition, fitness and ecology in which social insect biologists will find a rich storehouse of ideas and information, and behavioral ecologists will find a bracing challenge to long accepted models. Engagingly written, bold, and provocative, The Evolution of Social Wasps marks a milestone in our understanding of one of lifes major evolutionary transitions - the origin of social behavior.

Sample: "What does language do? Or, what does culture do? Language and

culture are non-genetic mechanisms for increasing the number of qualities across individuals, and language and culture also increase the capacity for intraspecific assortative mating across individuals in the human species (by increasing the number of dissimilarities and categories of similarities across individuals in the human species). It is interesting to consider functional analogies amongst animals and plants: Birdsong and feather colors in bird species, and the colors and shapes of angiosperm flowering plant species play similar functions in these species, i.e., they increase the number and differentiation of characteristics across individual organisms, thus increasing the capacity for assortative mating across individual organisms in bird species (intraspecific assortative mating), and increasing the capacity for assortative mating across angiosperm species and insect, bee, and bird species (interspecific assortative mating).""

Overzicht van de gevolgen van het ontstaan van landbouw in de prehistorie, zowel op technisch als cultureel gebied, en de voor- en nadelen daarvan voor de menselijke gezondheid.

Uiteenzetting van traditionele en nieuwe hypothesen over het ontstaan van leven op aarde.

Richard Dawkins en Yan Wong nemen ons mee op een opwindende, omgekeerde reis door vier miljard jaar evolutie, van de hedendaagse mens terug

naar de microbiële oorsprong van het leven. Naast mensen komen we onderweg ook dieren, planten en bacteriën tegen, ieder met een eigen verhaal. Vrijwel elke pagina in deze nieuwe uitgave is aangepast op basis van de resultaten van recente onderzoeken. Zo leidden nieuwe ontwikkelingen in DNA-onderzoek tot aanzienlijke herzieningen van de verhalen van onder andere de mitochondriale Eva, de bonobo, de olifantsvogel en de longvis. Het resultaat is een volledig bijgewerkte editie van een van de meest originele verslagen van de evolutie ooit geschreven.

This book discusses several recent theoretic advancements in interdisciplinary and transdisciplinary integration in the field of evolution. While exploring novel views, the text maintains a close link with one of the most broadly held views on evolution, namely that of “Darwinian evolution.” This work puts forth a new point of view which allows researchers to define in detail the concept of evolution. To create this conceptual definition, the text applies a stringent object-based focus. With this focus, the editor has been able to develop an object-based pattern of evolution at the smallest scale. Subsequently, this smallest scale pattern is used as an innovative basis for generalizations. These generalizations create links between biological Darwinism and generalized Darwinism. The object-based approach that was used to suggest innovations in the field of Darwinian evolution

also allowed for contributions to other topics, such as major evolutionary transitions theory, the definition of life and the relationships between evolution, self-organization and thermodynamics. Together, the chapters of this book and the multidisciplinary reflections and comments of various specialists on these chapters offer an exciting palette of innovative ideas.