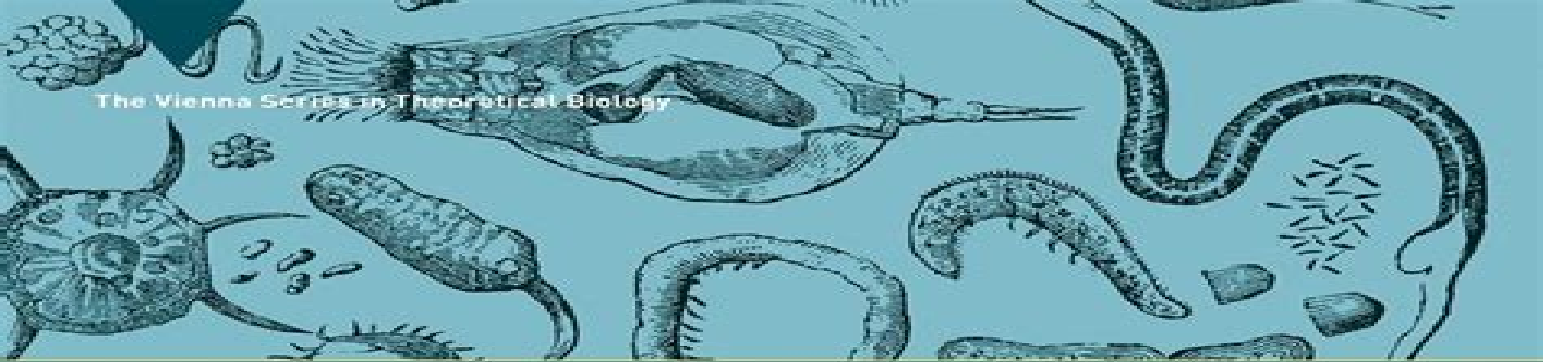
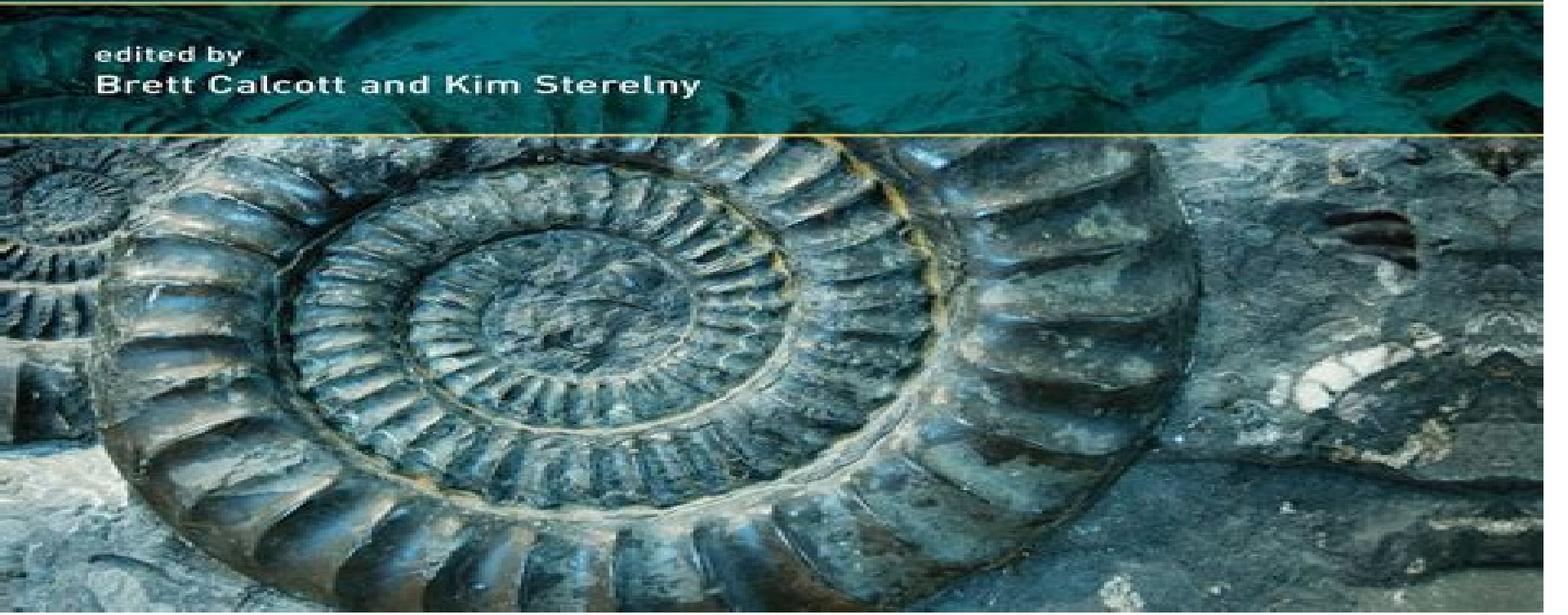




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The Major Transitions in Evolution Revisited



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The Major Transitions In Evolution

Sahotra Sarkar, Anya Plutynski



The Major Transitions In Evolution:

The Major Transitions in Evolution John Maynard Smith, Eors Szathmary, 1997-10-30 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 of multicellular 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 the similarities 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 that could 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 of cooperation 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 the content 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.

The Major Transitions in Evolution Revisited Brett Calcott, Kim Sterelny, 2011-04-22 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 Eors Szathm ry published their influential book *The Major Transitions in Evolution*. The transitions that Maynard Smith and Szathm ry 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 Szathm ry had planned a major revision of their work, but the death of Maynard Smith in 2004 prevented this. In this volume, prominent scholars, including Szathm ry 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.

Schulgesetze der Realschule zu Schneeberg, 1876

On the Origin of Autonomy Bernd Rosslenbroich, 2014-04-15 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 The Major Transitions in Evolution Roberta May Fisher,2015

Major Transitions in Evolution Teaching Company,2010 *Evolution and Transitions in Complexity* Gerard A.J.M Jagers op Akkerhuis,2016-10-18 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 **Social evolution and the what, when, why and how of the**

major evolutionary transitions in the history of life Peter Nonacs,Heikki Helanterä,Karen Marie Kapheim,2023-01-27

The Third Law of Evolution and The Future of Life Gerard A. J. M. Jagers op Akkerhuis,2024-11-25 This book offers a step by step introduction to an integrated theory of physical and biological evolution from the early universe to the world we know today To this end the well known laws of variation and selection are supplemented by a third law This law describes the

increase in complexity based on the transitions from quarks to hadrons to atoms to molecules to bacteria to eukaryotic cells and so on These insights revolutionize existing theoretical frameworks for analyzing organization in nature accelerating developments in natural philosophy In this way the author develops a basic framework for thinking about evolution which can be applied to current debates in various research fields For example the new approach finally helps to find the systems based definitions of organism and life that have been sought for so long By extrapolating the framework one can even hypothesize about future evolution and our place as humans in it An exciting read for both philosophers and scientists **The**

Routledge Handbook of Evolutionary Approaches to Religion Yair Lior, Justin Lane, 2022-11-30 The past two decades have seen a growing interest in evolutionary and scientific approaches to religion The Routledge Handbook of Evolutionary Approaches to Religion is an outstanding reference source to the key topics problems and debates in this exciting and emerging field Comprising over thirty chapters by a team of international contributors the handbook pulls together scholarship in the following areas evolutionary psychology and the cognitive science of religion CSR cultural evolution the complementarity of evolutionary psychology cognitive science and cultural evolution Within these sections central issues debates and problems are examined including Cliodynamics cultural group selection costly signaling dual inheritance theory literacy transmitting narratives prosociality supernatural punishment cognition and ritual meme theory fusion theory sexual selection agency detection evoked culture social brain hypothesis theory of mind developmental psychology emergence theory social learning cultural cybernetics cultural epidemiology evolutionary and cultural psychology memetics by product and adaptationist theories of religion systems and information theory and computer modeling This Handbook is essential reading for students and researchers in religious studies and anthropology It will also be very useful to those in related fields such as psychology sociology of religion cognitive biology and evolutionary biology **Patterns and Processes of**

Vertebrate Evolution Robert Lynn Carroll, 1997-04-28 The factors that influenced the evolution of the vertebrates are compared with the importance of variation and selection that Darwin emphasised in this broad study of the patterns and forces of evolutionary change Genome Evolution Axel Meyer, Yves van de Peer, 2011-06-28 In the years since the publication of Susumu Ohno's 1970 landmark book Evolution by gene duplication tremendous advances have been made in molecular biology and especially in genomics Studies of genome structure and function prerequisite to testing hypotheses of genome evolution were all but impossible until recent methodological advances This book evaluates newly generated empirical evidence as it pertains to theories of genomic evolutionary patterns and processes Tests of hypotheses using analyses of complete genomes interpreted in a phylogenetic context provide evidence regarding the relative importance of gene duplication The alternative explanation is that the evolution of regulatory elements that control the expression of and interactions among genes has been a more important force in shaping evolutionary innovation This collection of papers will be of interest to all academic and industry researchers working in the fields of molecular biology biotechnology genomics and

genome centers

The Gene's-Eye View of Evolution J. Arvid Ågren, 2021-07-21 Arvid Ågren has undertaken the most meticulously thorough reading of the relevant literature that I have ever encountered deploying an intelligent understanding to pull it into a coherent story As if that wasn't enough he gets it right Richard Dawkins To many evolutionary biologists the central challenge of their discipline is to explain adaptation the appearance of design in the living world With the theory of evolution by natural selection Charles Darwin elegantly showed how a purely mechanistic process can achieve this striking feature of nature Since then the way many biologists have thought about evolution and natural selection is as a theory about individual organisms Over a century later a subtle but radical shift in perspective emerged with the gene's-eye view of evolution in which natural selection was conceptualized as a struggle between genes for replication and transmission to the next generation This viewpoint culminated with the publication of *The Selfish Gene* by Richard Dawkins Oxford University Press 1976 and is now commonly referred to as selfish gene thinking The gene's-eye view has subsequently played a central role in evolutionary biology although it continues to attract controversy The central aim of this accessible book is to show how the gene's-eye view differs from the traditional organismal account of evolution trace its historical origins clarify typical misunderstandings and by using examples from contemporary experimental work show why so many evolutionary biologists still consider it an indispensable heuristic The book concludes by discussing how selfish gene thinking fits into ongoing debates in evolutionary biology and what they tell us about the future of the gene's-eye view of evolution *The Gene's Eye View of Evolution* is suitable for graduate level students taking courses in evolutionary biology behavioural ecology and evolutionary genetics as well as professional researchers in these fields It will also appeal to a broader interdisciplinary audience from the social sciences and humanities including philosophers and historians of science

A Companion to the Philosophy of Biology Sahotra Sarkar, Anya Plutynski, 2010-11-08 A COMPANION TO THE PHILOSOPHY OF BIOLOGY Sarkar is to be congratulated for assembling this talented team of philosophers who are themselves to be congratulated for writing these interesting essays on so many fascinating areas in philosophy of biology This book will be a wonderful resource for future work Elliot Sober University of Wisconsin Madison Many of the discussions here start with a definition of terms and a historical context of the subject before delving into the deeper philosophical issues making it a useful reference for students of biology as well as philosophy Northeastern Naturalist The topics that are addressed are done so well This book will appeal to the advanced student and knowledgeable amateur and may prove useful catalyst for discussion among research teams or those engaged in cross disciplinary studies Reference Reviews A Companion to the Philosophy of Biology offers concise overviews of philosophical issues raised by all areas of biology Addressing both traditional and emerging areas of philosophical interest the volume focuses on the philosophical implications of evolutionary theory as well as key topics such as molecular biology immunology and ecology Comprising essays by top scholars in the field this volume is an authoritative guide for professional philosophers historians sociologists and biologists as well as an accessible reference

work for students seeking to learn about this rapidly changing field **Darwin's Conjecture** Geoffrey M. Hodgson, Thorbjørn Knudsen, 2010-12-15 Of paramount importance to the natural sciences the principles of Darwinism which involve variation inheritance and selection are increasingly of interest to social scientists as well But no one has provided a truly rigorous account of how the principles apply to the evolution of human society until now In *Darwin's Conjecture* Geoffrey Hodgson and Thorbjørn Knudsen reveal how the British naturalist's core concepts apply to a wide range of phenomena including business practices legal systems technology and even science itself They also critique some prominent objections to applying Darwin to social science arguing that ultimately Darwinism functions as a general theoretical framework for stimulating further inquiry Social scientists who adopt a Darwinian approach they contend can then use it to frame and help develop new explanatory theories and predictive models This truly pathbreaking work at long last makes the powerful conceptual tools of Darwin available to the social sciences and will be welcomed by scholars and students from a range of disciplines *Speaking Our Minds* Thom Scott-Phillips, 2014-11-03 Language is an essential part of what makes us human Where did it come from How did it develop into the complex system we know today And what can an evolutionary perspective tell us about the nature of language and communication Drawing on a range of disciplines including cognitive science linguistics anthropology and evolutionary biology *Speaking Our Minds* explains how language evolved and why we are the only species to communicate in this way Written by a rising star in the field this groundbreaking book is required reading for anyone interested in understanding the origins and evolution of human communication and language *The Evolution of Multicellularity* Matthew D. Herron, Peter L. Conlin, William C. Ratcliff, 2022-06-07 Among the most important innovations in the history of life is the transition from single celled organisms to more complex multicellular organisms Multicellularity has evolved repeatedly across the tree of life resulting in the evolution of new kinds of organisms that collectively constitute a significant portion of Earth's biodiversity and have transformed the biosphere This volume examines the origins and subsequent evolution of multicellularity reviewing the types of multicellular groups that exist their evolutionary relationships the processes that led to their evolution and the conceptual frameworks in which their evolution is understood This important volume is intended to serve as a jumping off point stimulating further research by summarizing the topics that students and researchers of the evolution of multicellularity should be familiar with and highlighting future research directions for the field Chapter 13 of this book is freely available as a downloadable Open Access PDF at <http://www.taylorfrancis.com> under a Creative Commons Attribution Non Commercial No Derivatives CC BY NC ND 4.0 license

Animal Behaviour: Evolution and Mechanisms Nils Anthes, Peter M. Kappeler, Ralph Bergmüller, Wolf Blanckenhorn, H. Jane Brockmann, Claudia Fichtel, Lutz Fromhage, Joachim Frommen, Wolfgang Goymann, Juergen Heinze, Katharina Hirschenhauser, Heribert Hofer, Sylvia Kaiser, Bart Kempenaers, Gerald Kerth, Judith Ingrid Korb, Kurt M. Kotrschal, Cornelia Kraus, Martha Manser, Nico Michiels, Robin F. A. Moritz, Mario Pahl, Dustin Penn, Norbert Sachser, Martin

Schaefer, Carel P. van Schaik, Jutta M. Schneider, Isabella Schreiber, Michael Taborsky, Jürgen Tautz, Fritz Trillmich, Shaowu Zhang, 2010-04-03 This up to date review examines key areas of animal behaviour including communication cognition conflict cooperation sexual selection and behavioural variation Various tests are covered including recent empirical examples

Handbook on Evolution and Society Alexandra Maryanski, Richard Machalek, Jonathan H. Turner, 2015-11-17 Handbook on Evolution and Society brings together original chapters by prominent scholars who have been instrumental in the revival of evolutionary theorizing and research in the social sciences over the last twenty five years Previously unpublished essays provide up to date critical surveys of recent research and key debates The contributors discuss early challenges posed by sociobiology the rise of evolutionary psychology the more conflicted response of evolutionary sociology to sociobiology and evolutionary psychology Chapters address the application and limitations of Darwinian ideas in the social sciences Prominent authors come from a variety of disciplines in ecology biology primatology psychology sociology and the humanities The most comprehensive resource available this vital collection demonstrates to scholars and students the new ways in which evolutionary approaches ultimately derived from biology are influencing the diverse social sciences and humanities

Landscapes of Collectivity in the Life Sciences Snait B. Gissis, Ehud Lamm, Ayelet Shavit, 2018-01-12 Broad perspective on collectivity in the life sciences from microorganisms to human consensus and the theoretical and empirical opportunities and challenges Many researchers and scholars in the life sciences have become increasingly critical of the traditional methodological focus on the individual This volume counters such methodological individualism by exploring recent and influential work in the life sciences that utilizes notions of collectivity sociality rich interactions and emergent phenomena as essential explanatory tools to handle numerous persistent scientific questions in the life sciences The contributors consider case studies of collectivity that range from microorganisms to human consensus discussing theoretical and empirical challenges and the innovative methods and solutions scientists have devised The contributors offer historical philosophical and biological perspectives on collectivity and describe collective phenomena seen in insects the immune system communication and human collectivity with examples ranging from cooperative transport in the longhorn crazy ant to the evolution of autobiographical memory They examine ways of explaining collectivity including case studies and modeling approaches and explore collectivity's explanatory power They present a comprehensive look at a specific case of collectivity the Holobiont notion the idea of a multi species collective a host and diverse microorganisms and the hologenome theory which posits that the holobiont and its hologenome are a unit of adaption The volume concludes with reflections on the work of the late physicist Eshel Ben Jacob pioneer in the study of collective phenomena in living systems Contributors Oren Bader John Beatty Dinah R Davison Daniel Dor Ofer Feinerman Raghavendra Gadagkar Scott F Gilbert Snait B Gissis Deborah M Gordon James Griesemer Zachariah I Grochau Wright Erik R Hanschen Eva Jablonka Mohit Kumar Jolly Anat Kolumbus Ehud Lamm Herbert Levine Arnon Levy Xue Fei Li Elisabeth A Lloyd Yael Lubin Eva Maria Luef Ehud Meron Richard E Michod

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