

# Concepts of Symbiogenesis

A Historical and  
Critical Study of  
the Research of  
Russian Botanists

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# Concepts Of Symbiogenesis A Historical And Critical Study Of The Research Of Russian Botanists

**Stanley Shostak**



## **Concepts Of Symbiogenesis A Historical And Critical Study Of The Research Of Russian Botanists:**

*Symbiogenesis* Boris Mikhaïlovich Kozo-Polianskiĭ, 2010-06-15 Evolution      **Advances in Artificial Life** Dario Floreano, Jean-Daniel Nicoud, Francesco Mondada, 2007-10-23 No matter what your perspective is what your goals are or how experienced you are Artificial Life research is always a learning experience The variety of phenomena that the people who gathered in Lausanne reported and discussed for the fifth time since 1991 at the European Conference on Artificial Life ECAL has not been programmed crafted or assembled by analytic design It has evolved emerged or appeared spontaneously from a process of artificial evolution self organisation or development Artificial Life is a field where biological and artificial sciences meet and blend together where the dynamics of biological life are reproduced in the memory of computers where machines evolve behave and communicate like living organisms where complex life like entities are synthesised from electronic chromosomes and artificial chemistries The impact of Artificial Life in science philosophy and technology is tremendous Over the years the synthetic approach has established itself as a powerful method for investigating several complex phenomena of life From a philosophical standpoint the notion of life and of intelligence is continuously reformulated in relation to the dynamics of the system under observation and to the embedding environment no longer a privilege of carbon based entities with brains and eyes At the same time the possibility of engineering machines and software with life like properties such as evolvability self repair and self maintenance is gradually becoming reality bringing new perspectives in engineering and applications      *Evolutionary Biology - Concepts, Molecular and Morphological Evolution* Pierre Pontarotti, 2010-08-24 The annual Evolutionary Biology Meetings in Marseille aim to bring together leading scientists promoting an exchange of state of the art knowledge and the formation of inter group collaborations This book presents the most representative contributions to the 13th meeting which was held in September 2009 It comprises 21 chapters which are organized into the following three categories Evolutionary Biology Concepts Genome Molecular Evolution Morphological Evolution Speciation This book offers an up to date overview of evolutionary biology concepts and their use in the biology of the 21st century      **Endosymbiotic Theories of Organelles Revisited** Naoki Sato, 2020-01-03 This book re-examines the endosymbiotic theory and presents various related theories and hypotheses since the first proposal in 1905 by a Russian biologist It also demonstrates that Lynn Margulis's contribution to the current endosymbiotic is less than sometimes thought and presents a plausible idea on how the organelles were formed Explaining that Margulis's initial work did not intend to show the endosymbiotic origin of chloroplasts and mitochondria the book discusses their endosymbiotic origin in the light of current biology with the help of clear visual images Further by including numerous historical facts and details of phylogenetic analyses using recent genomic data that are largely unknown to many in the field it offers deep insights into the history of biology phylogenetic analysis and the new evolutionary thinking 2017 was the 50 year anniversary of Margulis's first paper in the Journal of Theoretical Biology and 2020 will mark 50 years since the publication of her famous work Origin of

Eukaryotic Cells and as such this book offers a timely reconsideration of the works of Lynn Margulis and the endosymbiotic origin of organelles

**Concepts of Symbiogenesis** Liia Nikolaevna Khakhina, Lynn Margulis, Mark A.

McMenamin, 1992-01-01 Symbiogenesis a term first coined by the Russian botanist K S Merezhkovsky in the late nineteenth century is the evolution of new life forms from the physical union of different once independent partners In this book Khakhina traces the development of the concept in Russian and Soviet scientific literature reviewing the contributions of Merezhkovsky A S Famintsyn B M Kozo Polyansky and other prominent Russian scientists to theories of the role of symbiosis as a source of evolutionary information This book provides new information for English speaking scientists The evolutionary implications of symbiosis have only recently been acknowledged by western scientists and the sophisticated analysis by Russian biologists described by Khakhina is largely unknown Lynn Margulis and Mark McMenamin have written an introduction to Khakhina's book Published in the Soviet Union in 1979 The appendix by Donna C Mehos describes the American anatomist Ivan E Wallin whose theory of symbiogenesis species origin by the acquisition of microbial symbionts was definitively rejected by his peers The book is essential for anyone wishing to understand a topic of overwhelming importance for evolutionary biology and the history of science

Ascomycete Systematics David L. Hawksworth, 2013-12-25

Proceedings of a NATO ARW held in Paris France May 11-14 1993

**Artificial Life VII** Mark A. Bedau, John S.

McCaskill, Norman H. Packard, Steen Rasmussen, 2000-08-01 The term artificial life describes research into synthetic systems that possess some of the essential properties of life This interdisciplinary field includes biologists computer scientists physicists chemists geneticists and others Artificial life may be viewed as an attempt to understand high level behavior from low level rules for example how the simple interactions between ants and their environment lead to complex trail following behavior An understanding of such relationships in particular systems can suggest novel solutions to complex real world problems such as disease prevention stock market prediction and data mining on the Internet Since their inception in 1987 the Artificial Life meetings have grown from small workshops to truly international conferences reflecting the field's increasing appeal to researchers in all areas of science

*Eukaryotism and Symbiosis* Hainfried E.A. Schenk, Reinhold G.

Herrmann, Kwang W. Jeon, Norbert E. Müller, Werner Schwemmler, 2012-12-06 New techniques in molecular biology have brought spectacular new insights into the study of evolution at the molecular level This book presents the resulting relatively new concept of molecular phylogeny with an overview of current accomplishments and the future direction of research on organelle origin and evolution and the biology of the higher cell

**The Tangled Tree** David Quammen, 2019-08-06 In this

New York Times bestseller and longlist nominee for the National Book Award our greatest living chronicler of the natural world The New York Times David Quammen explains how recent discoveries in molecular biology affect our understanding of evolution and life's history In the mid 1970s scientists began using DNA sequences to reexamine the history of all life Perhaps the most startling discovery to come out of this new field the study of life's diversity and relatedness at the

molecular level is horizontal gene transfer HGT or the movement of genes across species lines It turns out that HGT has been widespread and important we now know that roughly eight percent of the human genome arrived sideways by viral infection a type of HGT In The Tangled Tree the grandest tale in biology David Quammen presents the science and the scientists involved with patience candor and flair Nature We learn about the major players such as Carl Woese the most important little known biologist of the twentieth century Lynn Margulis the notorious maverick whose wild ideas about mosaic creatures proved to be true and Tsutomu Wantanabe who discovered that the scourge of antibiotic resistant bacteria is a direct result of horizontal gene transfer bringing the deep study of genome histories to bear on a global crisis in public health David Quammen proves to be an immensely well informed guide to a complex story The Wall Street Journal In The Tangled Tree he explains how molecular studies of evolution have brought startling recognitions about the tangled tree of life including where we humans fit upon it Thanks to new technologies we now have the ability to alter even our genetic composition through sideways insertions as nature has long been doing The Tangled Tree is a source of wonder Quammen has written a deep and daring intellectual adventure The Boston Globe

**NEUROEPISTEMOLOGY** YURI ZAMBRANO,2012-10-01 The Epistemologic study of the mind mind problem Mind brain ToM and conscious cognition can apply the Theory of Neuronal Epistemology TNE based on backpropagation of specific neural networks For operating in functionalist terms and in a cognitive way the TNE is supported by a connectionist model holding the algorithmic equation that includes probabilistic features spatiotemporal units computational components and fractal geometric tensorial variables The main arguments of the TNE deal with the study of diverse neuronal lineages and their sophisticated specialization Neuronalism and the neurons knowledge A second argument is the Protein Epistem determining this specialization degree and the third is associated with connectionism The essential unit of the TNE formula is the Fractal Coincidental Pattern FCP used for evaluating the multiple vectorial probabilities of this small world during the quantal release of neurotransmitters Chimeras and Consciousness

Lynn Margulis,Celeste A. Asikainen,Wolfgang E. Krumbein,2011-04-22 Scientists elucidate the astounding collective sensory capacity of Earth and its evolution through time Chimeras and Consciousness begins the inquiry into the evolution of the collective sensitivities of life Scientist scholars from a range of fields including biochemistry cell biology history of science family therapy genetics microbial ecology and primatology trace the emergence and evolution of consciousness Complex behaviors and the social imperatives of bacteria and other life forms during 3 000 million years of Earth history gave rise to mammalian cognition Awareness and sensation led to astounding activities millions of species incessantly interacted to form our planet s complex conscious system Our planetmates all of them conscious to some degree were joined only recently by us the aggressive modern humans From social bacteria to urban citizens all living beings participate in community life Nested inside families within communities inside ecosystems each metabolizes takes in matter expends energy and excretes Each of the members of our own and other species in groups with incessantly shifting alliances receives and processes information

Mergers of radically different life forms with myriad purposes the chimeras of the title underlie dramatic metamorphosis and other positive evolutionary change Since early bacteria avoided produced and eventually used oxygen Earth s sensory systems have expanded and complexified The provocative essays in this book going far beyond science but undergirded by the finest science serve to put sensitive sensible life in its cosmic context      **The Biosphere** Vladimir I.

Vernadsky,1998-03-27 Vladimir Vernadsky was a brilliant and prescient scholar a true scientific visionary who saw the deep connections between life on Earth and the rest of the planet and understood the profound implications for life as a cosmic phenomenon DAVID H GRINSPOON AUTHOR OF VENUS REVEALED The Biosphere should be required reading for all entry level students in earth and planetary sciences ERIC D SCHNEIDER AUTHOR OF INTO THE COOL THE NEW

THERMODYNAMICS OF CREATIVE DESTRUCTION      **The Branches of Ecology** Frank N. Egerton,2023-01-31 The ecological sciences are a diverse array of major scientific disciplines They grew from minor sciences with little status in 1900 and now occupy crucial areas of research bearing on the future of our planet This book describes a century of growth and development A dramatic century long rise in the status of ecological knowledge was accompanied by the rise of professional ecological organizations the establishment of university faculties and the creation of government agencies advising on conservation natural resources and the prevention of pollution Like all sciences ecology continues to yield new findings and surprising revelations New technologies now address existential challenges facing our world This book documenting the rise of ecology is an inspiring history portending an important role in the twenty first century Key Features The author is the acknowledged authority on the history of ecology The content is familiar to members of the Ecological Society of America but has not previously been assembled into a single narrative Appropriate for a course in the history of ecology Provides a broad perspective on ecology Related Titles Egerton F N A Centennial History of the Ecological Society of America ISBN 978 0 3673 7763 2 Rieppel O Phylogenetic Systematics Haeckel to Hennig ISBN 978 0 3678 7645 6 Dronamraju K A Century of Geneticists Mutation to Medicine ISBN 978 1 4987 4866 7      **Molecular Evolution and Adaptive Radiation** Thomas J.

Givnish,Kenneth J. Sytsma,2000-05-08 This volume surveys advances in the study of adaptive radiation showing how molecular characters can be used to analyze the origin and pattern of diversification within a lineage in a non circular fashion      *Reticulate Evolution* Nathalie Gontier,2015-07-09 Written for non experts this volume introduces the mechanisms that underlie reticulate evolution Chapters are either accompanied with glossaries that explain new terminology or timelines that position pioneering scholars and their major discoveries in their historical contexts The contributing authors outline the history and original context of discovery of symbiosis symbiogenesis lateral gene transfer hybridization or divergence with gene flow and infectious heredity By applying key insights from the areas of molecular phylo genetics microbiology virology ecology systematics immunology epidemiology and computational science they demonstrate how reticulate evolution impacts successful survival fitness and speciation Reticulate evolution brings forth a challenge to the standard Neo Darwinian

framework which defines life as the outcome of bifurcation and ramification patterns brought forth by the vertical mechanism of natural selection Reticulate evolution puts forward a pattern in the tree of life that is characterized by horizontal mergings and lineage crossings induced by symbiosis symbiogenesis lateral gene transfer hybridization or divergence with gene flow and infective heredity making the tree of life look more like a web of life On an epistemological level the various means by which hereditary material can be transferred horizontally challenges our classic notions of units and levels of evolution fitness modes of transmission linearity communities and biological individuality The case studies presented examine topics including the origin of the eukaryotic cell and its organelles through symbiogenesis the origin of algae through primary and secondary symbiosis and dinoflagellates through tertiary symbiosis the superorganism and holobiont as units of evolution how endosymbiosis induces speciation in multicellular life forms transferrable and non transferrable plasmids and how they symbiotically interact with their host the means by which pro and eukaryotic organisms transfer genes laterally bacterial transformation transduction and conjugation as well as transposons and other mobile genetic elements hybridization and divergence with gene flow in sexually reproducing individuals current human microbiome and virome studies that impact our knowledge concerning the evolution of organismal health and acquired immunity and how symbiosis and symbiogenesis can be modelled in computational evolution

**The Oxford Handbook of Water Politics and Policy** Ken Conca,Erika Weinthal,2018 This handbook is currently in development with individual articles publishing online in advance of print publication At this time we cannot add information about unpublished articles in this handbook however the table of contents will continue to grow as additional articles pass through the review process and are added to the site Please note that the online publication date for this handbook is the date that the first article in the title was published online For more information please read the site FAQs

**Holistic Darwinism** Peter Corning,2010-08-15 In recent years evolutionary theorists have come to recognize that the reductionist individualist gene centered approach to evolution cannot sufficiently account for the emergence of complex biological systems over time Peter A Corning has been at the forefront of a new generation of complexity theorists who have been working to reshape the foundations of evolutionary theory Well known for his Synergism Hypothesis a theory of complexity in evolution that assigns a key causal role to various forms of functional synergy Corning puts this theory into a much broader framework in Holistic Darwinism addressing many of the issues and concepts associated with the evolution of complex systems Corning s paradigm embraces and integrates many related theoretical developments of recent years from multilevel selection theory to niche construction theory gene culture coevolution theory and theories of self organization Offering new approaches to thermodynamics information theory and economic analysis Corning suggests how all of these domains can be brought firmly within what he characterizes as a post neo Darwinian evolutionary synthesis

*Evolution of Sameness and Difference* Stanley Shostak,1999-08-19 An analysis of the problem of how the sameness and difference in living things are controlled normally in the course of development and

maintenance and abnormally in the course of defective growth tumours and cancer Like everything else in life the biological sameness and difference in organisms has evolved An understanding of this biological evolution will help control abnormalities such as those associated with birth defects and invasive destructive tumours *Origins of Life* Freeman Dyson, 1999-09-28 How did life on earth originate Did replication or metabolism come first in the history of life In this book Freeman Dyson examines these questions and discusses the two main theories that try to explain how naturally occurring chemicals could organize themselves into living creatures The majority view is that life began with replicating molecules the precursors of modern genes The minority belief is that random populations of molecules evolved metabolic activities before exact replication existed Dyson analyzes both of these theories with reference to recent important discoveries by geologists and chemists His main aim is to stimulate experiments that could help to decide which theory is correct This second edition covers the enormous advances that have been made in biology and geology in the past and the impact they have had on our ideas about how life began It is a clearly written fascinating book that will appeal to anyone interested in the origins of life

**Secret Chambers** Martin Brasier, 2012-05-31 In the follow up to Darwin's Lost World Martin Brasier introduces the quest for the missing history of life and the cell Through a series of journeys it emerges that the modern plant cell is one of the most deeply puzzling and unlikely steps in the whole history of life Decoding this puzzle is a great adventure that has mainly taken place over the last half century Brasier puts the big questions into context through lively descriptions of his explorations around the world from the Caribbean Sea and the Egyptian pyramids to the shores of the great lakes in Canada and to the reefs and deserts of Australia Covering the period from 1 to 2 billion years ago a period he once dubbed the boring billion he demonstrates how it in fact involved great evolutionary potential with the formation of the complex eukaryotic cell Without this cell there would be nothing on Earth today except bacteria and the formation of this cell was a fundamental turning point in the history of life on Earth Weaving together several threads Brasier emphasizes the importance of single celled forms to marine ecosystems symbiosis and coral reefs and the architecture and beauty of single celled Foraminifera and what they tell us about evolution From a master storyteller comes a vivid description of the earliest biological forms and a set of fascinating tales of travels and research



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