

The Vital Question Energy Evolution And The Origins Of Complex Life

Power, Sex, Suicide America's Energy Future Molecular Biology of the Cell Origin Story The Universe Within Creative Evolution Life on the Edge The Emergence of Life What is Life? A New History of Life DE EVOLUTION Into the Cool In Search of Cell History Life Ascending Energy in Farm Production The Power to Compete The Biopsychosocial Model of Health and Disease The Vital Question Cosmosapiens Carbon Province, Hydro Province Proving Darwin Virus as Populations Burning Galileo Oxygen Life on a Young Planet Life's Engines Breverton's Complete Herbal Visual Contrast Eruption Concepts of Biology Harvesting the Biosphere The Vital Force Gene Machine The Vital Question: Energy, Evolution, and the Origins of Complex Life The Vital Question Symphony in C: Carbon and the Evolution of (Almost) Everything Junk DNA Life's Ratchet The Evolution of American Women's Studies Life Evolving

Power, Sex, Suicide

Why has Canada been unable to achieve any of its climate-change targets? Part of the reason is that emissions in two provinces, Alberta and Saskatchewan, already about half the Canadian total when taken together, have been steadily increasing as a result of expanding oil and gas production. Declining emissions in other provinces, such as Ontario, Quebec, Nova Scotia and New Brunswick, have been cancelled out by those western increases. The ultimate explanation for Canadian failure lies in the differing energy interests of the western and eastern provinces, overlaid on the confederation fault-line of western alienation. Climate, energy, and national unity form a toxic mix. How can Ottawa possibly get all the provinces moving in the same direction of decreasing emissions? To answer this question, Douglas Macdonald explores the five attempts to date to put in place co-ordinated national policy in the fields of energy and climate change - from Pierre Trudeau's ill-fated National Energy Program to Justin Trudeau's bitterly contested Pan-Canadian program - analyzing and comparing them for the first time. Important new insights emerge from this analysis which, in turn, provide the basis for a new approach. Carbon Province, Hydro Province is a major contribution to both academic understanding and the vital question of how our federal and provincial governments can effectively work together and thereby for the first time achieve a Canadian climate-change target.

America's Energy Future

Concepts of Biology is designed for the single-semester introduction to biology course for non-science majors, which for many students is their only college-level science course. As such, this course represents an important opportunity for students to develop the necessary knowledge, tools, and skills to make informed decisions as they continue with their lives. Rather than being mired down with facts and vocabulary, the typical non-science major student needs information presented in a way that is easy to read and understand. Even more importantly, the content should be meaningful. Students do much better when they understand why biology is relevant to their everyday lives. For these reasons, Concepts of Biology is grounded on an evolutionary basis and includes exciting features that highlight careers in the biological sciences and everyday applications of the concepts at hand. We also strive to show the interconnectedness of topics within this extremely broad discipline. In order to meet the needs of today's instructors and students, we maintain the overall organization and coverage

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found in most syllabi for this course. A strength of Concepts of Biology is that instructors can customize the book, adapting it to the approach that works best in their classroom. Concepts of Biology also includes an innovative art program that incorporates critical thinking and clicker questions to help students understand--and apply--key concepts.

Molecular Biology of the Cell

This book is comprised of reflections by diverse women's studies scholars, focusing on the many ways in which the field has evolved from its first introduction in the University setting to the present day.

Origin Story

A Nobel Prize-winning biologist tells the riveting story of his race to discover the inner workings of biology's most important molecule "Ramakrishnan's writing is so honest, lucid and engaging that I could not put this book down until I had read to the very end."--Siddhartha Mukherjee, author of The Emperor of All Maladies and The Gene Everyone has heard of DNA. But by itself, DNA is just an inert blueprint for life. It is the ribosome--an enormous molecular machine made up of a million atoms--that makes DNA come to life, turning our genetic code into proteins and therefore into us. Gene Machine is an insider account of the race for the structure of the ribosome, a fundamental discovery that both advances our knowledge of all life and could lead to the development of better antibiotics against life-threatening diseases. But this is also a human story of Ramakrishnan's unlikely journey, from his first fumbling experiments in a biology lab to being the dark horse in a fierce competition with some of the world's best scientists. In the end, Gene Machine is a frank insider's account of the pursuit of high-stakes science.

The Universe Within

The origin of life from inanimate matter has been the focus of much research for decades, both experimentally and philosophically. Luisi takes the reader through the consecutive stages from prebiotic chemistry to synthetic biology, uniquely combining both approaches. This book presents a systematic course discussing the successive stages of self-organisation, emergence, self-replication, autopoiesis, synthetic compartments and construction of cellular models, in order to demonstrate the spontaneous increase in complexity from inanimate matter to the first cellular life forms. A chapter is dedicated to each of these steps, using a number of synthetic and biological examples. With end-of-chapter review questions to aid reader comprehension, this book will appeal to graduate students and academics researching the origin of life and related areas such as evolutionary biology, biochemistry, molecular biology, biophysics and natural sciences.

Creative Evolution

An interdisciplinary and quantitative account of human claims on the biosphere's stores of living matter, from prehistoric hunting to modern energy production. The biosphere--the Earth's thin layer of life--dates from nearly four billion years ago, when the first simple organisms appeared. Many species have exerted enormous influence on the biosphere's character and productivity, but none has transformed the Earth in so many ways and on such a scale as Homo sapiens. In Harvesting the Biosphere, Vaclav Smil offers an interdisciplinary and

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quantitative account of human claims on the biosphere's stores of living matter, from prehistory to the present day. Smil examines all harvests--from prehistoric man's hunting of megafauna to modern crop production--and all uses of harvested biomass, including energy, food, and raw materials. Without harvesting of the biomass, Smil points out, there would be no story of human evolution and advancing civilization; but at the same time, the increasing extent and intensity of present-day biomass harvests are changing the very foundations of civilization's well-being. In his detailed and comprehensive account, Smil presents the best possible quantifications of past and current global losses in order to assess the evolution and extent of biomass harvests. Drawing on the latest work in disciplines ranging from anthropology to environmental science, Smil offers a valuable long-term, planet-wide perspective on human-caused environmental change.

Life on the Edge

Specialist scientific fields are developing at incredibly swift speeds, but what can they really tell us about how the universe began and how we as humans evolved to play such a dominant role on Earth? John Hands' extraordinarily ambitious book merges scientific knowledge from multiple disciplines and evaluates without bias or preconception all the theories and evidence about the origin and evolution of matter, consciousness, and mankind. The result, a "pearl of dialectical reasoning" (Publishers Weekly, starred review), provides the most comprehensive account yet of current ideas such as cosmic inflation, dark energy, the selfish gene, and neurogenetic determinism. In the clearest possible prose it differentiates the firmly established from the speculative and examines the claims of various fields to approach a unified theory of everything. In doing so it challenges the orthodox consensus in those branches of cosmology, biology, and neuroscience that have ossified into dogma. Its "shocking and invigorating" analysis (Daily Telegraph, A Best Science Book of 2015) reveals underlying patterns of cooperation, complexification, and convergence that lead to the unique emergence in humans of a self-reflective consciousness that enables us to determine our future evolution. This groundbreaking book is destined to become a classic of scientific thinking.

The Emergence of Life

Winner of the 2010 Royal Society Prize for science books Powerful new research methods are providing fresh and vivid insights into the makeup of life. Comparing gene sequences, examining the atomic structure of proteins and looking into the geochemistry of rocks have all helped to explain creation and evolution in more detail than ever before. Nick Lane uses the full extent of this new knowledge to describe the ten greatest inventions of life, based on their historical impact, role in living organisms today and relevance to current controversies. DNA, sex, sight and consciousnesses are just four examples. Lane also explains how these findings have come about, and the extent to which they can be relied upon. The result is a gripping and lucid account of the ingenuity of nature, and a book which is essential reading for anyone who has ever questioned the science behind the glories of everyday life.

What is Life?

Mitochondria are tiny structures located inside our cells that carry out the essential task of producing energy for the cell. They are found in all complex living things, and in that sense, they are fundamental for driving complex life on the planet. But there is much more to them than that. Mitochondria have their own DNA, with their own small collection of genes, separate

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from those in the cell nucleus. It is thought that they were once bacteria living independent lives. Their enslavement within the larger cell was a turning point in the evolution of life, enabling the development of complex organisms and, closely related, the origin of two sexes. Unlike the DNA in the nucleus, mitochondrial DNA is passed down exclusively (or almost exclusively) via the female line. That's why it has been used by some researchers to trace human ancestry daughter-to-mother, to 'Mitochondrial Eve'. Mitochondria give us important information about our evolutionary history. And that's not all. Mitochondrial genes mutate much faster than those in the nucleus because of the free radicals produced in their energy-generating role. This high mutation rate lies behind our ageing and certain congenital diseases. The latest research suggests that mitochondria play a key role in degenerative diseases such as cancer, through their involvement in precipitating cell suicide. Mitochondria, then, are pivotal in power, sex, and suicide. In this fascinating and thought-provoking book, Nick Lane brings together the latest research findings in this exciting field to show how our growing understanding of mitochondria is shedding light on how complex life evolved, why sex arose (why don't we just bud?), and why we age and die. This understanding is of fundamental importance, both in understanding how we and all other complex life came to be, but also in order to be able to control our own illnesses, and delay our degeneration and death. Oxford Landmark Science books are 'must-read' classics of modern science writing which have crystallized big ideas, and shaped the way we think.

A New History of Life

“One of the deepest, most illuminating books about the history of life to have been published in recent years.” —The Economist The Earth teems with life: in its oceans, forests, skies and cities. Yet there's a black hole at the heart of biology. We do not know why complex life is the way it is, or, for that matter, how life first began. In *The Vital Question*, award-winning author and biochemist Nick Lane radically reframes evolutionary history, putting forward a solution to conundrums that have puzzled generations of scientists. For two and a half billion years, from the very origins of life, single-celled organisms such as bacteria evolved without changing their basic form. Then, on just one occasion in four billion years, they made the jump to complexity. All complex life, from mushrooms to man, shares puzzling features, such as sex, which are unknown in bacteria. How and why did this radical transformation happen? The answer, Lane argues, lies in energy: all life on Earth lives off a voltage with the strength of a lightning bolt. Building on the pillars of evolutionary theory, Lane's hypothesis draws on cutting-edge research into the link between energy and cell biology, in order to deliver a compelling account of evolution from the very origins of life to the emergence of multicellular organisms, while offering deep insights into our own lives and deaths. Both rigorous and enchanting, *The Vital Question* provides a solution to life's vital question: why are we as we are, and indeed, why are we here at all?

DE EVOLUTION

Tim Rundle takes a look at Shape, Color, Placement, and Personality and reveals how these seemingly abstract concepts are, in fact, the stylist's essential tools and the key to a beautiful, practical, and individual home. Using dozens of examples of real-life homes and plenty of insightful practical advice, Tim analyses successful interiors, explains the basics of a well-designed space, shows how to bring out the best in what you already own, and discusses the elusive art of arrangement and display. His secret weapon is visual contrast, which creates a dynamic visual dialogue between objects and spaces, resulting in an interior that's full of personality, style, and unexpected combinations.

Into the Cool

Seventy years ago, Erwin Schrödinger posed a profound question: 'What is life, and how did it emerge from non-life?' Scientists have puzzled over it ever since. Addy Pross uses insights from the new field of systems chemistry to show how chemistry can become biology, and that Darwinian evolution is the expression of a deeper physical principle.

In Search of Cell History

Why is life the way it is? Bacteria evolved into complex life just once in four billion years of life on earth - and all complex life shares many strange properties, from sex to ageing and death. If life evolved on other planets, would it be the same or completely different? In *The Vital Question*, Nick Lane radically reframes evolutionary history, putting forward a cogent solution to conundrums that have troubled scientists for decades. The answer, he argues, lies in energy: how all life on Earth lives off a voltage with the strength of a bolt of lightning. In unravelling these scientific enigmas, making sense of life's quirks, Lane's explanation provides a solution to life's vital questions: why are we as we are, and why are we here at all? This is ground-breaking science in an accessible form, in the tradition of Charles Darwin's *The Origin of Species*, Richard Dawkins' *The Selfish Gene*, and Jared Diamond's *Guns, Germs and Steel*.

Life Ascending

Energy in Farm Production

Oxygen has had extraordinary effects on life. Three hundred million years ago, in Carboniferous times, dragonflies grew as big as seagulls, with wingspans of nearly a metre. Researchers claim they could have flown only if the air had contained more oxygen than today - probably as much as 35 per cent. Giant spiders, tree-ferns, marine rock formations and fossil charcoals all tell the same story. High oxygen levels may also explain the global firestorm that contributed to the demise of the dinosaurs after the asteroid impact. The strange and profound effects that oxygen has had on the evolution of life pose a riddle, which this book sets out to answer. Oxygen is a toxic gas. Divers breathing pure oxygen at depth suffer from convulsions and lung injury. Fruit flies raised at twice normal atmospheric levels of oxygen live half as long as their siblings. Reactive forms of oxygen, known as free radicals, are thought to cause ageing in people. Yet if atmospheric oxygen reached 35 per cent in the Carboniferous, why did it promote exuberant growth, instead of rapid ageing and death? *Oxygen* takes the reader on an enthralling journey, as gripping as a thriller, as it unravels the unexpected ways in which oxygen spurred the evolution of life and death. The book explains far more than the size of ancient insects: it shows how oxygen underpins the origin of biological complexity, the birth of photosynthesis, the sudden evolution of animals, the need for two sexes, the accelerated ageing of cloned animals like Dolly the sheep, and the surprisingly long lives of bats and birds. Drawing on this grand evolutionary canvas, *Oxygen* offers fresh perspectives on our own lives and deaths, explaining modern killer diseases, why we age, and what we can do about it. Advancing revelatory new ideas, following chains of evidence, the book ranges through many disciplines, from environmental sciences to molecular medicine. The result is a captivating vision of contemporary science and a humane synthesis of our place in nature. This remarkable book will redefine the way we think about the world.

The Power to Compete

A physicist describes how life emerges from the random motion of atoms through sophisticated cellular machinery and describes the long quest to determine the true nature of life from ancient Greece to the study of modern nanotechnology. 20,000 first printing.

The Biopsychosocial Model of Health and Disease

This comprehensive history of cell evolution “deftly discusses the definition of life” as well as cellular organization, classification and more (San Francisco Book Review). The origin of cells remains one of the most fundamental mysteries in biology, one that has spawned a large body of research and debate over the past two decades. With *In Search of Cell History*, Franklin M. Harold offers a comprehensive, impartial take on that research and the controversies that keep the field in turmoil. Written in accessible language and complemented by a glossary for easy reference, this book examines the relationship between cells and genes; the central role of bioenergetics in the origin of life; the status of the universal tree of life with its three stems and viral outliers; and the controversies surrounding the last universal common ancestor. Harold also discusses the evolution of cellular organization, the origin of complex cells, and the incorporation of symbiotic organelles. *In Search of Cell History* shows us just how far we have come in understanding cell evolution—and the evolution of life in general—and how far we still have to go. “Wonderful...A loving distillation of connections within the incredible diversity of life in the biosphere, framing one of biology’s most important remaining questions: how did life begin?”—Nature

The Vital Question

Australopithecines, dinosaurs, trilobites--such fossils conjure up images of lost worlds filled with vanished organisms. But in the full history of life, ancient animals, even the trilobites, form only the half-billion-year tip of a nearly four-billion-year iceberg. Andrew Knoll explores the deep history of life from its origins on a young planet to the incredible Cambrian explosion, presenting a compelling new explanation for the emergence of biological novelty. The very latest discoveries in paleontology--many of them made by the author and his students--are integrated with emerging insights from molecular biology and earth system science to forge a broad understanding of how the biological diversity that surrounds us came to be. Moving from Siberia to Namibia to the Bahamas, Knoll shows how life and environment have evolved together through Earth's history. Innovations in biology have helped shape our air and oceans, and, just as surely, environmental change has influenced the course of evolution, repeatedly closing off opportunities for some species while opening avenues for others. Readers go into the field to confront fossils, enter the lab to discern the inner workings of cells, and alight on Mars to ask how our terrestrial experience can guide exploration for life beyond our planet. Along the way, Knoll brings us up-to-date on some of science's hottest questions, from the oldest fossils and claims of life beyond the Earth to the hypothesis of global glaciation and Knoll's own unifying concept of "permissive ecology." In laying bare Earth's deepest biological roots, *Life on a Young Planet* helps us understand our own place in the universe--and our responsibility as stewards of a world four billion years in the making. In a new preface, Knoll describes how the field has broadened and deepened in the decade since the book's original publication.

Cosmosapiens

Carbon Province, Hydro Province

A metamathematician best known for his discovery of the Omega number explains how Darwin's theory of evolution succeeds on a mathematic level and argues that no one can be certain about evolution without a proven mathematical theory. Original.

Proving Darwin

From the author of the acclaimed *The Epigenetics Revolution* ('A book that would have had Darwin swooning' – Guardian) comes another thrilling exploration of the cutting edge of human science. For decades after the structure of DNA was identified, scientists focused purely on genes, the regions of the genome that contain codes for the production of proteins. Other regions – 98% of the human genome – were dismissed as 'junk'. But in recent years researchers have discovered that variations in this 'junk' DNA underlie many previously intractable diseases, and they can now generate new approaches to tackling them. Nessa Carey explores, for the first time for a general audience, the incredible story behind a controversy that has generated unusually vituperative public exchanges between scientists. She shows how junk DNA plays an important role in areas as diverse as genetic diseases, viral infections, sex determination in mammals, human biological complexity, disease treatments, even evolution itself – and reveals how we are only now truly unlocking its secrets, more than half a century after Crick and Watson won their Nobel prize for the discovery of the structure of DNA in 1962.

Virus as Populations

For multi-user PDF licensing, please contact customer service. Energy touches our lives in countless ways and its costs are felt when we fill up at the gas pump, pay our home heating bills, and keep businesses both large and small running. There are long-term costs as well: to the environment, as natural resources are depleted and pollution contributes to global climate change, and to national security and independence, as many of the world's current energy sources are increasingly concentrated in geopolitically unstable regions. The country's challenge is to develop an energy portfolio that addresses these concerns while still providing sufficient, affordable energy reserves for the nation. The United States has enormous resources to put behind solutions to this energy challenge; the dilemma is to identify which solutions are the right ones. Before deciding which energy technologies to develop, and on what timeline, we need to understand them better. *America's Energy Future* analyzes the potential of a wide range of technologies for generation, distribution, and conservation of energy. This book considers technologies to increase energy efficiency, coal-fired power generation, nuclear power, renewable energy, oil and natural gas, and alternative transportation fuels. It offers a detailed assessment of the associated impacts and projected costs of implementing each technology and categorizes them into three time frames for implementation.

Burning Galileo

Demonstrates how the second law of thermodynamics--which refers to energy's tendency to change from being concentrated in one place to being spread out over time--is behind evolution, ecology, economics, and even the origins of life itself in this scientific tour de force

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that explores how complex systems emerge, enlarge, and reproduce in a chaotic world.

Oxygen

The stewards of Earth, these organisms transformed the chemistry of our planet to make it habitable for plants, animals, and us.

Life on a Young Planet

Life's Engines

An enchanting biography of the most resonant—and most necessary—chemical element on Earth. Carbon is everywhere: in the paper of this book and the blood of our bodies. It's with us from beginning to end, present in our baby clothes and coffin alike. We live on a carbon planet, and we are carbon life. No other element is so central to our well-being; yet, when missing or misaligned, carbon atoms can also bring about disease and even death. At once ubiquitous and mysterious, carbon holds the answers to some of humanity's biggest questions. Where did Earth come from? What will ultimately become of it—and of us? With poetic storytelling, earth scientist Robert M. Hazen explores the universe to discover the past, present, and future of life's most essential element. We're not only "made of star stuff," as Carl Sagan famously observed, but "Big Bang stuff," too. Hazen reveals that carbon's grand symphony began with a frenzied prelude shortly after the dawn of creation, bringing new attention to the tiny number of Big Bang–created carbon atoms that often get overlooked. In minutes, violently colliding protons and neutrons improbably formed the first carbon atoms, which can still be found within our bodies. His book then unfolds in four movements, building momentum as he explores carbon as the element of Earth, Air, Fire, and Water. He visits the famed volcanic crater Solfatara di Pozzuoli near Naples, where venting carbon dioxide and other noxious fumes condense into beautiful crystals. He climbs the cliffs of the Scottish Highlands and delves deep into the precious-metal mines of Namibia, journeying toward Earth's mysterious core in search of undocumented carbon structures. Hazen often asks us to pause and consider carbon's role in climate change and what we can do about it, for our lives and this element are inextricably intertwined. With prose that sparkles like a diamond, *Symphony in C* tells the story of carbon, in which we all have a part.

Breverton's Complete Herbal

Creative Evolution, originally published in 1911 by Henry Holt and Company, is the work which catapulted Bergson from obscurity into world-wide fame. A study of the philosophical implications of biological evolutionary theory, the impact of this book reached far beyond biology and seemed to many to herald a new age in philosophy and the sciences.

Visual Contrast

Life is the most extraordinary phenomenon in the known universe; but how does it work? It is remarkable that in this age of cloning and even synthetic biology, nobody has ever made anything living entirely out of dead material. Life remains the only way to make life. Are we missing a vital ingredient in its creation? Like Richard Dawkins' *The Selfish Gene*, which provided a new perspective on evolution by shifting the focus of natural selection from

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organisms to genes, Life On The Edge alters our understanding of life from cells or biomolecules to the fundamental particles that drive life's dynamics. From this new perspective, life makes more sense as its missing ingredient is revealed to be quantum mechanics and the strange phenomena that lie at the heart of this most mysterious of sciences. -- Provided by publisher.

Eruption

From one of our finest and most popular science writers, the best-selling author of *Your Inner Fish*, comes the answer to a scientific mystery story as big as the world itself: How have astronomical events that took place millions of years ago created the unique qualities of the human species? In his last book, Neil Shubin delved into the amazing connections between human anatomy—our hands, our jaws—and the structures in the fish that first took over land 375 million years ago. Now, with his trademark clarity and exuberance, he takes an even more expansive approach to the question of why we are the way we are. Starting once again with fossils, Shubin turns his gaze skyward. He shows how the entirety of the universe's 14-billion-year history can be seen in our bodies. From our very molecular composition (a result of stellar events at the origin of our solar system), he makes clear, through the working of our eyes, how the evolution of the cosmos has had profound effects on the development of human life on earth. From the Hardcover edition.

Concepts of Biology

For months in early 1980, scientists, journalists, and nearby residents listened anxiously to rumblings from Mount St. Helens in southwestern Washington State. Still, no one was prepared when a cataclysmic eruption blew the top off of the mountain, laying waste to hundreds of square miles of land and killing fifty-seven people. Steve Olson interweaves vivid personal stories with the history, science, and economic forces that influenced the fates and futures of those around the volcano. *Eruption* delivers a spellbinding narrative of an event that changed the course of volcanic science, and an epic tale of our fraught relationship with the natural world.

Harvesting the Biosphere

"If you're as interested in Japan as I am, I think you'll find that *The Power to Compete* is a smart and thought-provoking look at the future of a fascinating country." - Bill Gates, "5 Books to Read This Summer" Father and son – entrepreneur and economist – search for Japan's economic cure *The Power to Compete* tackles the issues central to the prosperity of Japan – and the world – in search of a cure for the "Japan Disease." As founder and CEO of Rakuten, one of the world's largest Internet companies, author Hiroshi Mikitani brings an entrepreneur's perspective to bear on the country's economic stagnation. Through a freewheeling and candid conversation with his economist father, Ryoichi Mikitani, the two examine the issues facing Japan, and explore possible roadmaps to revitalization. How can Japan overhaul its economy, education system, immigration, public infrastructure, and hold its own with China? Their ideas include applying business techniques like Key Performance Indicators to fix the economy, using information technology to cut government bureaucracy, and increasing the number of foreign firms with a head office in Japan. Readers gain rare insight into Japan's future, from both academic and practical perspectives on the inside. Mikitani argues that Japan's tendency to shun international frameworks and hide from global realities is the root of the problem, while

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Mikitani Sr.'s background as an international economist puts the issue in perspective for a well-rounded look at today's Japan. Examine the causes of Japan's endless economic stagnation Discover the current efforts underway to enhance Japan's competitiveness Learn how free market "Abenomics" affected Japan's economy long-term See Japan's issues from the perspective of an entrepreneur and an economist Japan's malaise is seated in a number of economic, business, political, and cultural issues, and this book doesn't shy away from hot topics. More than a discussion of economics, this book is a conversation between father and son as they work through opposing perspectives to help their country find The Power to Compete.

The Vital Force

In just a half century, humanity has made an astounding leap in its understanding of life. Now, one of the giants of biological science, Christian de Duve, discusses what we've learned in this half century, ranging from the tiniest cells to the future of our species and of life itself. With wide-ranging erudition, De Duve takes us on a dazzling tour of the biological world, beginning with the invisible workings of the cell, the area in which he won his Nobel Prize. He describes how the first cells may have arisen and suggests that they may have been like the organisms that exist today near deep-sea hydrothermal vents. Contrary to many scientists, he argues that life was bound to arise and that it probably only took millennia--maybe tens of thousands of years--to move from rough building blocks to the first organisms possessing the basic properties of life. With equal authority, De Duve examines topics such as the evolution of humans, the origins of consciousness, the development of language, the birth of science, and the origin of emotion, morality, altruism, and love. He concludes with his conjectures on the future of humanity--for instance, we may evolve, perhaps via genetic engineering, into a new species--and he shares his personal thoughts about God and immortality. In *Life Evolving*, one of our most eminent scientists sums up what he has learned about the nature of life and our place in the universe. An extraordinarily wise and humane volume, it will fascinate readers curious about the world around them and about the impact of science on philosophy and religion.

Gene Machine

This New York Times bestseller "elegantly weaves evidence and insights . . . into a single, accessible historical narrative" (Bill Gates) and presents a captivating history of the universe -- from the Big Bang to dinosaurs to mass globalization and beyond. Most historians study the smallest slivers of time, emphasizing specific dates, individuals, and documents. But what would it look like to study the whole of history, from the big bang through the present day -- and even into the remote future? How would looking at the full span of time change the way we perceive the universe, the earth, and our very existence? These were the questions David Christian set out to answer when he created the field of "Big History," the most exciting new approach to understanding where we have been, where we are, and where we are going. In *Origin Story*, Christian takes readers on a wild ride through the entire 13.8 billion years we've come to know as "history." By focusing on defining events (thresholds), major trends, and profound questions about our origins, Christian exposes the hidden threads that tie everything together -- from the creation of the planet to the advent of agriculture, nuclear war, and beyond. With stunning insights into the origin of the universe, the beginning of life, the emergence of humans, and what the future might bring, *Origin Story* boldly reframes our place in the cosmos.

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This open access book is a systematic update of the philosophical and scientific foundations of the biopsychosocial model of health, disease and healthcare. First proposed by George Engel 40 years ago, the Biopsychosocial Model is much cited in healthcare settings worldwide, but has been increasingly criticised for being vague, lacking in content, and in need of reworking in the light of recent developments. The book confronts the rapid changes to psychological science, neuroscience, healthcare, and philosophy that have occurred since the model was first proposed and addresses key issues such as the model's scientific basis, clinical utility, and philosophical coherence. The authors conceptualise biology and the psychosocial as in the same ontological space, interlinked by systems of communication-based regulatory control which constitute a new kind of causation. These are distinguished from physical and chemical laws, most clearly because they can break down, thus providing the basis for difference between health and disease. This work offers an urgent update to the model's scientific and philosophical foundations, providing a new and coherent account of causal interactions between the biological, the psychological and social.

The Vital Question

Virus as Populations: Composition, Complexity, Dynamics, and Biological Implications explains fundamental concepts that arise from regarding viruses as complex populations when replicating in infected hosts. Fundamental phenomena in virus behavior, such as adaptation to changing environments, capacity to produce disease, probability to be transmitted or response to treatment, depend on virus population numbers and in the variations of such population numbers. Concepts such as quasispecies dynamics, mutations rates, viral fitness, the effect of bottleneck events, population numbers in virus transmission and disease emergence, new antiviral strategies such as lethal mutagenesis, and extensions of population heterogeneity to nonviral systems are included. These main concepts of the book are framed in recent observations on general virus diversity derived from metagenomic studies, and current views on the origin of viruses and the role of viruses in the evolution of the biosphere. Features current views on the key steps in the origin of life and origins of viruses Includes examples relating ancestral features of viruses with their current adaptive capacity Explains complex phenomena in an organized and coherent fashion that is easy to comprehend and enjoyable to read Considers quasispecies as a framework to understand virus adaptability and disease processes

Symphony in C: Carbon and the Evolution of (Almost) Everything

This last volume of the Energy in World Agriculture series is in many ways the series' Alpha and its Omega. It addresses the broad issues related to the use of energy in agricultural production, and also characterizes and quantifies the energy involvements of many agricultural production technologies. It is a compilation of descriptive and analytical information and design principles and data of energy use in this field. A significant aspect is the relationship between energy and agricultural productivity, increased knowledge and resulting improved management of energy-consuming operations on the farm. Information provided here has not been published elsewhere before. Throughout the book are examples of the important role that energy inputs have played in increasing productivity of the world's agricultural systems. Together with a revived interest in energy for agricultural production due to increases in energy costs, this volume meets that interest with valuable information and insights.

Junk DNA

Why is life the way it is? Bacteria evolved into complex life just once in four billion years of life on earth-and all complex life shares many strange properties, from sex to ageing and death. If life evolved on other planets, would it be the same or completely different? In *The Vital Question*, Nick Lane radically reframes evolutionary history, putting forward a cogent solution to conundrums that have troubled scientists for decades. The answer, he argues, lies in energy: how all life on Earth lives off a voltage with the strength of a bolt of lightning. In unravelling these scientific enigmas, making sense of life's quirks, Lane's explanation provides a solution to life's vital questions: why are we as we are, and why are we here at all? This is ground-breaking science in an accessible form, in the tradition of Charles Darwin's *The Origin of Species*, Richard Dawkins' *The Selfish Gene*, and Jared Diamond's *Guns, Germs and Steel*.

Life's Ratchet

The history of life on Earth is, in some form or another, known to us all--or so we think. *A New History of Life* offers a provocative new account, based on the latest scientific research, of how life on our planet evolved--the first major new synthesis for general readers in two decades. Charles Darwin's theories, first published more than 150 years ago, form the backbone of how we understand the history of the Earth. In reality, the currently accepted history of life on Earth is so flawed, so out of date, that it's past time we need a 'New History of Life.' In their latest book, Joe Kirschvink and Peter Ward will show that many of our most cherished beliefs about the evolution of life are wrong. Gathering and analyzing years of discoveries and research not yet widely known to the public, *A New History of Life* proposes a different origin of species than the one Darwin proposed, one which includes eight-foot-long centipedes, a frozen "snowball Earth", and the seeds for life originating on Mars. Drawing on their years of experience in paleontology, biology, chemistry, and astrobiology, experts Ward and Kirschvink paint a picture of the origins life on Earth that are at once too fabulous to imagine and too familiar to dismiss--and looking forward, *A New History of Life* brilliantly assembles insights from some of the latest scientific research to understand how life on Earth can and might evolve far into the future.

The Evolution of American Women's Studies

Breverton's *Complete Herbal* is a modern reworking of Culpeper's classic reference guide, *Culpeper's Complete Herbal*. Arranged alphabetically, this book describes over 250 herbs and spices as well as feature entries on scented herb/medicinal gardens, the great herbalists and New World Herbs not included in Culpepper's original text. Each entry provides a description of the herb: its appearance and botanical features, a brief history of its uses in medicine, dyeing and cuisine to bizarre remedies and concoctions designed to get rid of all manner of real and imaginary ailments. As informative as it is entertaining, this incredibly diverse compendium contains just about everything you'll ever need to know about the properties and provenance of herbs and spices of the world. From amara dulcis to yarrow, all-heal to viper's bugloss, *Breverton's Complete Herbal* is a modern day treasury of over 250 herbs and their uses.

Life Evolving

A large sophisticated telescope complex sits atop a dormant volcano in one of Earth's most remote locations. Some incredibly bright but fiercely independent folks operate it much of the

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time. They detect, map, and perform threat analysis of near-Earth objects. Shortly after the world narrowly escapes an extinction event, they start collecting pieces of a related cosmic puzzle. When they've connected enough of them, an intriguing and disturbing picture emerges. Yet the most revealing pieces don't reveal themselves until after all life on Earth already has begun marching in lockstep toward possible oblivion.

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