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Concepts of Biology Biodiversity and Earth History Focus on Biodiversity Research Evolution of Living Organisms Evolution Ecology From Molecules to Living Organisms: An Interplay Between Biology and Physics Opportunities in Biology The Fabric of Geology A Framework for K-12 Science Education Molecular Biology of the Cell Teaching About Evolution and the Nature of Science Inanimate Life Biomes and Ecosystems Mercury Hazards to Living Organisms Mechanical Design in Organisms The Ecology Book Eden's Endemics The Evolutionary Biology of Extinct and Extant Organisms Our Living World (eBook) Conserving Biodiversity Chemistry and the Living Organism Advances in Aquatic Ecology Organisms Micrographia: Or Some Physiological Descriptions Of Minute Bodies Made By Magnifying Glasses Size Control in Biology A Text-Book of Botany (Classic Reprint) Genetics and the Logic of Evolution Animals in Our Midst: The Challenges of Co-existing with Animals in the Anthropocene The Importance of Biological Interactions in the Study of Biodiversity The Biosphere Earth Stewardship Evolutionary Biology Biology for AP ® Courses Life's Edge Emergent Properties of Individual Organisms The Oldest Living Things in the World NSSC Biology Module 3 Glimpses of Creatures in Their Physical Worlds In the Beginning was Information

Biological diversity, or "biodiversity," refers to the variety of all life on earth, and the complex relationships among living things, and between living things and their environment. Biodiversity includes genetic variety, species diversity, and variability in communities, ecosystems and landscapes. Biodiversity sustains the environments in which we live and on which our lives and those of every other living creature on Earth depend. Thanks to biodiversity, we are able to obtain such necessary goods as food, clothing, medicine, and fuel. Equally important are the ecosystem services that biodiversity provides, such as clean air and drinkable water. Conservation scientists have identified a number of universal threats to biodiversity: habitat loss and degradation, invasive species, pollution, overpopulation, overexploitation and consumption, and global climate change. This book examines critical issues in this field from researchers around the globe. Excerpt from A d104-Book of Botany IT is customary to place all living beings in either the animal 01 vegetable kingdoms, but in reality a sharp boundary line between animals and plants first becomes possible when they exhibit a complicated structure. In those of more simple organisation all distinctions disappear, and it becomes difficult to define the exact limits of Botany and Zoology. This, in fact, could scarcely be otherwise, as all the processes of life, in both the animal and vegetable kingdoms, are dependent On the same substance, protoplasm. With more complicated organisation, the specific differences increase, and the characteristics distinguishing animal from vegetable life become more obvious. For the present, it must be confessed, the recognition Of an organism, as an animal or a plant, is dependent upon its corre spondence with an abstract idea of what a plant or animal Should be, .based on certain points of agreement between the members of each class. A satisfactory basis for the Separation of all living organisms into the categories of animals or plants can only be obtained when it is shown that all organisms distinguished as animals are in reality genetically connected, and that a similar connection exists between all plants. The proof of this can only be arrived at through the theory OF evolution. From the study of the fossil remains and impressions Of animals and plants, it has been established that in former epochs forms Of life. Differing from those of the present age existed on the earth. It is also generally assumed that all living animals and plants have been derived by gradual modification from previously existing forms. This leads to the further conclusion that those organisms possess ing closely Similar structure, which are united as species in a genus, are in reality related to one another. It is also probable that the union of corresponding genera into one familv and of families into higher groups serves to give expression to a real relationship existing between them. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at www.forgottenbooks.com This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works. 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 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. FINALIST FOR THE PEN/E.O. WILSON LITERARY SCIENCE WRITING AWARD***A NEW YORK TIMES NOTABLE BOOK OF 2021***A SCIENCE NEWS FAVORITE BOOK OF 2021***A SMITHSONIAN TOP TEN SCIENCE BOOK OF 2021 “Stories that both dazzle and edify… This book is not just about life, but about discovery itself.” —Siddhartha Mukherjee, New York Times Book Review We all assume we know what life is, but the more scientists learn about the living world—from protocells to brains, from zygotes to pandemic viruses—the harder they find it is to locate life’s edge. Carl Zimmer investigates one of the biggest questions of all: What is life? The answer seems obvious until you try to seriously answer it. Is the apple sitting on your kitchen counter alive, or is only the apple tree it came from deserving of the word? If we can’t answer that question here on earth, how will we know when and if we discover alien life on other worlds? The question hangs over some of society’s most charged conflicts—whether a fertilized egg is a living person, for example, and when we ought to declare a person legally dead. Life's Edge is an utterly fascinating investigation that no one but one of the most celebrated science writers of our generation could craft. Zimmer journeys through the strange experiments that have attempted to re-create life. Literally hundreds of definitions of what that should look like now exist, but none has yet emerged as an obvious winner. Lists of what living things have in common do not add up to a theory of life. It's never clear why some items on the list are essential and others not. Coronaviruses have altered the course of history, and yet many scientists maintain they are not alive. Chemists are creating droplets that can swarm, sense their environment, and multiply. Have they made life in the lab? Whether he is handling pythons in Alabama or searching for hibernating bats in the Adirondacks, Zimmer revels in astounding examples of life at its most bizarre. He tries his own hand at evolving life in a test tube with unnerving results. Charting the obsession with Dr. Frankenstein's monster and how the world briefly believed radium was the source of all life, Zimmer leads us all the way into the labs and minds of researchers engineering life from scratch. Glimpses of Creatures in Their Physical Worlds offers an eye-opening look into how the characteristics of the physical world drive the designs of animals and plants. These characteristics impose limits but also create remarkable and subtle opportunities for the functional biology of organisms. In particular, Steven Vogel examines the size and scale, and trade-offs among different physical processes. He pays attention to how the forms and activities of animals and plants reflect the materials available to nature, and he explores the unique constraints and possibilities provided by fluid flow, structural design, and environmental forces. Each chapter of the book investigates a facet of the physical world, including the drag on small projectiles; the importance of diffusion and convection; the size-dependence of acceleration; the storage, conduction, and dissipation of heat; the relationship among pressure, flow, and choice in biological pumps; and how elongate structures tune their relative twistiness and bendiness. Vogel considers design-determining factors all too commonly ignored, and builds a bridge between the world described by physics books and the reality experienced by all creatures. Glimpses of Creatures in Their Physical Worlds contains a wealth of accessible information related to functional biology, and requires little more than a basic background in secondary-school science and mathematics. Drawing examples from creatures of land, air, and water, the book demonstrates the many uses of biological diversity and how physical forces impact biological organisms. NSSC Biology is a course consisting of three Modules, an Answer Book and a Teacher's Guide. The course has been written and designed to prepare students for the Namibia Senior Secondary Certificate (NSSC) Ordinary and Higher Level, or similar examinations. The modules have been developed for distance learners and learners attending schools. NSSC Biology is high-quality support material. Features of the books include: ' modules divided into units, each focusing on a different theme ' stimulating and thought-provoking activities, designed to encourage critical thinking ' word boxes providing language support ' highlighted and explained key terminology ' step-by-step guidelines aimed towards achieving the learning outcomes ' self-evaluation to facilitate learning and assess skills and knowledge ' clear distinction between Ordinary and Higher Level content ' an outcomes-based approach encouraging student-centred learning ' detailed feedback in the Answer Book promoting a thorough understanding of content through recognising errors and correcting them. This Open Access book brings together authoritative voices in animal and environmental ethics, who address the many different facets of changing human-animal relationships in the Anthropocene. As we are living in complex times, the issue of how to establish meaningful relationships with other animals under Anthropocene conditions needs to be approached from a multitude of angles. This book offers the reader insight into the different discussions that exist around the topics of how we should understand animal agency, how we could take animal agency seriously in farms, urban areas and the wild, and what technologies are appropriate and morally desirable to use regarding animals. This book is of interest to both animal studies scholars and environmental ethics scholars, as well as to practitioners working with animals, such as wildlife managers, zookeepers, and conservation biologists. Explains biomes and ecosystems, disucsses the importance of maintaining a healthy diversity among living things and their habitats, and describes ways life is created and sustained. Today many school students are shielded from one of the most important concepts in modern science: evolution. In engaging and conversational style, Teaching About Evolution and the Nature of Science provides a well-structured framework for understanding and teaching evolution. Written for teachers, parents, and community officials as well as scientists and educators, this book describes how evolution reveals both the great diversity and similarity among the Earth's organisms; it explores how scientists approach the question of evolution; and it illustrates the nature of science as a way of knowing about the natural world. In addition, the book provides answers to frequently asked questions to help readers understand many of the issues and misconceptions about evolution. The book includes sample activities for teaching about evolution and the nature of science. For example, the book includes activities that investigate fossil footprints and population growth that teachers of science can use to introduce principles of evolution. Background information, materials, and step-by-step presentations are provided for each activity. In addition, this volume: Presents the evidence for evolution, including how evolution can be observed today. Explains the nature of science through a variety of examples. Describes how science differs from other human endeavors and why evolution is one of the best avenues for helping students understand this distinction. Answers frequently asked questions about evolution. Teaching About Evolution and the Nature of Science builds on the 1996 National Science Education Standards released by the National Research Councilâ€"and offers detailed guidance on how to evaluate and choose instructional materials that support the standards. Comprehensive and practical, this book brings one of today's educational challenges into focus in a balanced and reasoned discussion. It will be of special interest to teachers of science, school administrators, and interested members of the community. The Oldest Living Things in the World is an epic journey through time and space. Over the past decade, artist Rachel Sussman has researched, worked with biologists, and traveled the world to photograph continuously living organisms that are 2,000 years old and older. Spanning from Antarctica to Greenland, the Mojave Desert to the Australian Outback, the result is a stunning and unique visual collection of ancient organisms unlike anything that has been created in the arts or sciences before, insightfully and accessibly narrated by Sussman along the way. Her work is both timeless and timely, and spans disciplines, continents, and millennia. It is underscored by an innate environmentalism and driven by Sussman’s relentless curiosity. She begins at “year zero,” and looks back from there, photographing the past in the present. These ancient individuals live on every continent and range from Greenlandic lichens that grow only one centimeter a century, to unique desert shrubs in Africa and South America, a predatory fungus in Oregon, Caribbean brain coral, to an 80,000-year-old colony of aspen in Utah. Sussman journeyed to Antarctica to photograph 5,500-year-old moss; Australia for stromatolites, primeval organisms tied to the oxygenation of the planet and the beginnings of life on Earth; and to Tasmania to capture a 43,600-year-old self-propagating shrub that’s the last individual of its kind. Her portraits reveal the living history of our planet—and what we stand to lose in the future. These ancient survivors have weathered millennia in some of the world’s most extreme environments, yet climate change and human encroachment have put many of them in danger. Two of her subjects have already met with untimely deaths by human hands. Alongside the photographs, Sussman relays fascinating – and sometimes harrowing – tales of her global adventures tracking down her subjects and shares insights from the scientists who research them. The oldest living things in the world are a record and celebration of the past, a call to action in the present, and a barometer of our future. Part of a sequence of science activity books for grades 1-6. This title focuse on activities that help students in grade 1 understand the similarities and differences between plant and animal life. The Evolutionary Biology of Extinct and Extant Organisms offers a thorough and detailed narration of the journey of biological evolution and its major transitional links to the biological world, which began with paleontological exploration of extinct organisms and now carries on with reviews of phylogenomic footprint reviews of extant, living fossils. This book moves through the defining evolutionary stepping stones starting with the evolutionary changes in prokaryotic, aquatic organisms over 4 billion years ago to the emergence of the modern human species in Earth’s Anthropocene. The book begins with an overview of the processes of evolutionary fitness, the epicenter of the principles of evolutionary biology. Whether through natural or experimental occurrence, evolutionary fitness has been found to be the cardinal instance of evolutionary links in an organism between its ancestral and contemporary states. The book then goes on to detail evolutionary trails and lineages of groups of organisms including mammalians, reptilians, and various fish. The final section of the book provides a look back at the evolutionary journey of "nonliving" or extinct organisms, versus the modern-day transition to "living" or extant organisms. The Evolutionary Biology of Extinct and Extant Organisms is the ideal resource for any researcher or advanced student in evolutionary studies, ranging from evolutionary biology to general life sciences. Provides an updated compendium of evolution research history Details the evolution trails of organisms, including mammals, reptiles, arthropods, annelids, mollusks, protozoa, and more Offers an accessible and easy-to-read presentation of complex, in-depth evolutionary biology facts and theories This text is about the central role of evolution in shaping the nature and diversity of the living world. It describes the processes of natural selection, how adaptations arise, and how new species form, as well as summarizing the evidence for evolution At one time, Hooke was a research assistant to Robert Boyle. He is believed to be one of the greatest inventive geniuses of all time and constructed one of the most famous of the early compound microscopes. The scientific study of the interactions of organisms with each other and with their environment is referred to as ecology. It also includes the relationships between individuals of the same species, between different species, and between organisms and their physical and chemical environments. Aquatic ecology focuses on the study of plants and animals as well as these relationships in the aquatic environments such as oceans, estuaries, lakes, ponds, wetlands, rivers and streams. The physical characteristics of an aquatic habitat affect the kind of organisms that are present there. Living organisms found in a particular ecosystem are directly affected by environmental characteristics such as nutrient concentrations, temperature, water flow and shelter. This book outlines the processes and applications of aquatic ecology in detail. There has been rapid progress in this field and its environmental applications are finding their way across multiple industries. Scientists and students actively engaged in aquatic ecology will find this book full of crucial and unexplored concepts. This work has been selected by scholars as being culturally important and is part of the knowledge base of civilization as we know it. This work is in the public domain in the United States of America, and possibly other nations. Within the United States, you may freely copy and distribute this work, as no entity (individual or corporate) has a copyright on the body of the work. Scholars believe, and we concur, that this work is important enough to be preserved, reproduced, and made generally available to the public. To ensure a quality reading experience, this work has been proofread and republished using a format that seamlessly blends the original graphical elements with text in an easy-to-read typeface. We appreciate your support of the preservation process, and thank you for being an important part of keeping this knowledge alive and relevant. This book deals with an interface between mechanical engineering and biology. It reviews biological structural materials and systems and their mechanically important features and demonstrates that function at any particular level of biological integration is permitted and controlled by structure at lower levels of integration. Information is the cornerstone of life, yet it is something people don't often think about. In his fascinating new book, In the Beginning Was Information, Dr. Werner Gitt helps the reader see how the very presence of information reveals a Designer. The book gathers lecture notes of courses given at the 2014 summer school on integrated biology in Les Houches, France, Session CII. It addresses an emerging field ranging from molecules to cells and to organisms. Through examples it presents a new way of thinking using a combination of interdisciplinary and cutting-edge methods, bridging physics and biology beyond current biophysics. Important novel developments are expected in the coming years that may well introduce paradigm shifts in biological science. The school had the ambition to prepare participants to become major actors in these breakthroughs. The power of integrated approaches is illustrated through two cases: interactions between viruses and host cells, and flower development. The role of forces in biology, as well as their mathematical modeling, is illustrated in both processes: how they allow flower organs to emerge or how they control membrane fusion during virus budding. The book also underlines the importance of conformational changes and dynamics of proteins particularly during membrane processes. It explains how membrane proteins can be handled and studied by molecular simulations. Finally, the book also contains concepts in cell biology, in thermodynamics and several novel approaches such as in-cell NMR. Altogether, the chapters show how examining a biological system from different viewpoints based on multidisciplinary aspects often leads to enriching controversial arguments. Life on Earth can be viewed as a complex network of interactions between living organisms and their respective environments. By parsing the natural world into various ecosystems and biomes, the extent and significance of such interaction among species and between organisms and their natural habitats becomes abundantly clear. The study of ecology forms the heart of this engaging volume, which explores the formation of ecological communities and examines the biological diversity that forms the backbone of life on the planet. Evolution of Living Organisms: Evidence for a New Theory of Transformation discusses traditional interpretations of evolution with a new assumption. The book presents a rational and general account of real evolutionary phenomena based on paleontology and molecular biological data. The text reviews biological evolution from the simple to the complex or progressive and regressive evolution. The author explains the appearance of types of organization from Captorhinomorphs to Pelycosaurs to the Theriodonts— from which the mammals arose. He also explains that in the evolution to mammals, the transformation of the Theriodonts concerned only the skeleton, muscles, dentition, and not the brain. He cites the case of the Perissodactyls as an example. The author also asserts that paleontology and molecular biology can explain the mechanism of evolution without even detailing the causes of orientations of lineages, of the finalities of structures, of living functions, and of cycles. But this approach will involve metaphysics. This book can be appreciated by anthropologists, researcher and scientists involved in zoology, paleontology, genetics and biochemistry. The loss of the earth's biological diversity is widely recognized as a critical environmental problem. That loss is most severe in developing countries, where the conditions of human existence are most difficult. Conserving Biodiversity presents an agenda for research that can provide information to formulate policy and design conservation programs in the Third World. The book includes discussions of research needs in the biological sciences as well as economics and anthropology, areas of critical importance to conservation and sustainable development. Although specifically directed toward development agencies, non-governmental organizations, and decisionmakers in developing nations, this volume should be of interest to all who are involved in the conservation of biological diversity. The latest version of this popular textbook updates the content and format of previous editions to make it more appealing to students and more useful to instructors. Concentrates on the relationship between basic chemical concepts and the chemistry of living organisms. Delves into such topical issues as alcoholism, radiation therapy, and effects of food chemicals on the brain. This edition features a STEP problem solving strategy which provides a consistent method to solve all problems in the book, an extensive glossary plus full-color art work. Study the relationship between living organisms and our place in God's wondrous creation! Learn important words and concepts from different habitats around the world to mutual symbiosis as a product of the relational character of God. Designed with a multi-age level format especially for homeschool educational programs. Examine influential Scientists and their work, more fully understand practical aspects of stewardship, and investigate ecological connections in creation! The best-selling Wonders of Creation series adds a new biology-focused title that unveils the intricate nature of God's world and the harmony that was broken by sin. This educational resource is color-coded with three educational levels in mind: 5th to 6th grades, 7th to 8th grades, and 9th through 11th grades, which can be utilized for the classroom, independent study, or homeschool setting. Whether used as part of our newly developed science curriculum or simply as a unique unit study, the book includes full-color photos, informative illustrations, and meaningful descriptions. The text encourages an understanding of a world designed, not as a series of random evolutionary accidents, but instead as a wondrous, well-designed system of life around the globe created to enrich and support one another. Many of the characteristics that distinguish plants from other living organisms can be traced to their bacterial origin early in the history of life. These features-such as a multicellular haploid life stage, prevalent hermaphroditism, self-fertilization, and general dependence on biotic and abiotic vectors for reproduction-stem directly from the plant's ability to obtain energy from the sun. This novel mode of energy capture had far-ranging implications for plant evolution. It not only fueled the tremendous diversification of life on Earth that followed, but also had far-ranging implications for the evolution of photosynthetic microorganisms and eventually for land plants. Understanding the evolutionary processes for the proliferation and diversification of plants requires an appreciation of their unique biological features. While the processes of mutation, selection, genetic drift, and gene flow remain the same for both plants and animals, there are specific characteristics of plants that modify the way their evolution is implemented. Unique traits of plants affect everything from the fate of mutations, through exposure to selection in a haploid life phase, to the distribution of genetic variation within populations, and ultimately the rates and patterns of diversification. This book examines the origins of the unique evolutionary features of plants, as well as their implications for evolutionary processes. Author Mitchell B. Cruzan provides contemporary discussion of subjects including population genetics, phylogeography, phylogenetics, ecological genetics, and genomics. The book fills a need for modern coverage of these topics, all of which are essential to a wide range of advanced courses in plant biology. In the past thirty years biodiversity has become one

of the central organizing principles through which we understand the nonhuman environment. Its deceptively simple definition as the variation among living organisms masks its status as a hotly contested term both within the sciences and more broadly. In Eden’s Endemics, Elizabeth Callaway looks to cultural objects—novels, memoirs, databases, visualizations, and poetry— that depict many species at once to consider the question of how we narrate organisms in their multiplicity. Touching on topics ranging from seed banks to science fiction to bird-watching, Callaway argues that there is no set, generally accepted way to measure biodiversity. Westerners tend to conceptualize it according to one or more of an array of tropes rooted in colonial history such as the Lost Eden, Noah’s Ark, and Tree-of-Life imagery. These conceptualizations affect what kinds of biodiversities are prioritized for protection. While using biodiversity as a way to talk about the world aims to highlight what is most valued in nature, it can produce narratives that reinforce certain power differentials—with real-life consequences for conservation projects. Thus the choices made when portraying biodiversity impact what is visible, what is visceral, and what is unquestioned common sense about the patterns of life on Earth. The term biodiversity defines not only all the variety of life in the Earth but also their complex interactions. Under the current scenario of biodiversity loss, and in order to preserve it, it is essential to achieve a deep understanding on all the aspects related to the biological interactions, including their functioning and significance. This volume contains several contributions (nineteen in total) that illustrate the state of the art of the academic research in the field of biological interactions in its widest sense; that is, not only the interactions between living organisms are considered, but also those between living organisms and abiotic elements of the environment as well as those between living organisms and the humans. This book presents a program of basic studies dealing with living organisms. The characteristics of each living kingdom are presented and the diversity among species within the same kingdom is illustrated. Topics include algae, bacteria, fungi, and various species of plants and animals. Each of the twelve teaching units in this book is introduced by a color transparency (print books) or PowerPoint slide (eBooks) that emphasizes the basic concept of the unit and presents questions for discussion. Reproducible student pages provide reinforcement and follow-up activities. The teaching guide offers descriptions of the basic concepts to be presented, background information, suggestions for enrichment activities, and a complete answer key. This uniquely interdisciplinary textbook explores the exciting and complex relationship between Earth’s geological history and the biodiversity of life. Its innovative design provides a seamless learning experience, clarifying major concepts step by step with detailed textual explanations complemented by detailed figures, diagrams and vibrant pictures. Thanks to its layout, the respective concepts can be studied individually, as part of the broader framework of each chapter, or as they relate to the book as a whole. It provides in-depth coverage of: - Earth’s formation and subsequent geological history, including patterns of climate change and atmospheric evolution; - The early stages of life, from microbial ‘primordial soup’ theories to the fossil record’s most valuable contributions; - Mechanisms of mutual influence between living organisms and the environment: how life changed Earth’s history whilst, at the same time, environmental pressures continue to shape the evolution of species; - Basic ideas in biodiversity studies: species concepts, measurement techniques, and global distribution patterns; - Biological systematics, from their historical origins in Greek philosophy and Biblical stories to Darwinian evolution by natural selection, and to phylogenetics based on cutting-edge molecular techniques. This book’s four major sections offer a fresh cross-disciplinary overview of biodiversity and the Earth’s history. Among many other concepts, they reveal the massive diversity of eukaryotes, explain the geological processes behind fossilisation, and provide an eye-opening account of the relatively short period of human evolution in the context of Earth’s 4.6 billion-year history. Employing a combination of proven didactic tools, the book is simultaneously a reading reference, illustrated guide, and encyclopaedia of organismal biology and geology. It is aimed at school- and university-level students, as well as members of the public fascinated by the intricate interrelationship of living organisms and their environment. "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 This book begins by describing what an individual organism is, comparing preconceptions of the individual to non-standard ways of thinking about individuals. Variation in what individuals are is described, using giant fungi, clonal trees and honey bee hives as examples. Individuals are thus shown to be emergent properties. Other emergent properties of individuals are also described. Classic experiments that elucidated the source of emotions in humans and other mammals are described. Emotions arise from the actions of the nervous and endocrine system and often include a variety of signals given to other individuals of the same or different species. In particular, this book focuses on fear and anger, two emotions that are closely related and often confused, but that have been well studied. In one final example of emergent properties of individuals, cooperative behavior is analyzed. The behaviors displayed by individuals that facilitate cooperation among individuals and why those individuals may actually cooperate instead of compete when acquiring resources or defending against predators are discussed. Size is a primary feature of living things. From egg to adult, the various organs, tissues, cells, and subcellular structures that make up an organism grow to appropriate sizes so that they effectively fit and function together. The misregulation of this growth can lead to diseases such as cancer. Written and edited by experts in the field, this collection from Cold Spring Harbor Perspectives in Biology examines our current understanding of the intrinsic and extrinsic mechanisms that precisely regulate the sizes of biological structures so that they can function efficiently in their cellular, organismal, or ecological context. Contributors discuss the various genetic, hormonal, and environmental inputs that trigger cells to grow, divide, or die, the various signaling pathways involved, and how these determine the final body size of an organism and the proportions of its component tissues and organs. Size-sensing mechanisms that enable cells to maintain their optimal sizes are reviewed, as are the scaling mechanisms that organelles use to adjust their sizes in response to changes in cell size. Examples from across the tree of life--from bacteria to humans--are provided. The authors also describe the mysteries that still remain about cell size and its control, including the nature of the intriguing relationship between nuclear DNA content and cell size. This volume will therefore be fascinating reading for all cell, developmental, and evolutionary biologists. Biology has entered an era in which interdisciplinary cooperation is at an all-time high, practical applications follow basic discoveries more quickly than ever before, and new technologiesâ€"recombinant DNA, scanning tunneling microscopes, and moreâ€"are revolutionizing the way science is conducted. The potential for scientific breakthroughs with significant implications for society has never been greater. Opportunities in Biology reports on the state of the new biology, taking a detailed look at the disciplines of biology; examining the advances made in medicine, agriculture, and other fields; and pointing out promising research opportunities. Authored by an expert panel representing a variety of viewpoints, this volume also offers recommendations on how to meet the infrastructure needsâ€"for funding, effective information systems, and other supportâ€"of future biology research. Exploring what has been accomplished and what is on the horizon, Opportunities in Biology is an indispensable resource for students, teachers, and researchers in all subdisciplines of biology as well as for research administrators and those in funding agencies. This book advances Earth Stewardship toward a planetary scale, presenting a range of ecological worldviews, practices, and institutions in different parts of the world and to use them as the basis for considering what we could learn from one another, and what we could do together. Today, inter-hemispheric, intercultural, and transdisciplinary collaborations for Earth Stewardship are an imperative. Chapters document pathways that are being forged by socio-ecological research networks, religious alliances, policy actions, environmental citizenship and participation, and new forms of conservation, based on both traditional and contemporary ecological knowledge and values. “The Earth Stewardship Initiative of the Ecological Society of America fosters practices to provide a stable basis for civilization in the future. Biocultural ethic emphasizes that we are co-inhabitants in the natural world; no matter how complex our inventions may become” (Peter Raven). Complex and ever changing in its forms and functions, the element mercury follows a convoluted course through the environment and up the food chain. The process is complicated further by the fact that the difference between tolerable natural background levels and harmful effects in the environment is exceptionally small and still not completely und Science, engineering, and technology permeate nearly every facet of modern life and hold the key to solving many of humanity's most pressing current and future challenges. The United States' position in the global economy is declining, in part because U.S. workers lack fundamental knowledge in these fields. To address the critical issues of U.S. competitiveness and to better prepare the workforce, A Framework for K-12 Science Education proposes a new approach to K-12 science education that will capture students' interest and provide them with the necessary foundational knowledge in the field. A Framework for K-12 Science Education outlines a broad set of expectations for students in science and engineering in grades K-12. These expectations will inform the development of new standards for K-12 science education and, subsequently, revisions to curriculum, instruction, assessment, and professional development for educators. This book identifies three dimensions that convey the core ideas and practices around which science and engineering education in these grades should be built. These three dimensions are: crosscutting concepts that unify the study of science through their common application across science and engineering; scientific and engineering practices; and disciplinary core ideas in the physical sciences, life sciences, and earth and space sciences and for engineering, technology, and the applications of science. The overarching goal is for all high school graduates to have sufficient knowledge of science and engineering to engage in public discussions on science-related issues, be careful consumers of scientific and technical information, and enter the careers of their choice. A Framework for K-12 Science Education is the first step in a process that can inform state-level decisions and achieve a research-grounded basis for improving science instruction and learning across the country. The book will guide standards developers, teachers, curriculum designers, assessment developers, state and district science administrators, and educators who teach science in informal environments. In this book the authors draw on what is known, largely from recent research, about the nature of genes and cells, the genetics of development and animal and plant body plans, intra- and interorganismal communication, sensation and perception, to propose that a few basic generalizations, along with the modified application of the classical evolutionary theory, can provide a broader theoretical understanding of genes, evolution, and the diverse and complex nature of living organisms. Biology for AP® courses covers the scope and sequence requirements of a typical two-semester Advanced Placement® biology course. The text provides comprehensive coverage of foundational research and core biology concepts through an evolutionary lens. Biology for AP® Courses was designed to meet and exceed the requirements of the College Board’s AP® Biology framework while allowing significant flexibility for instructors. Each section of the book includes an introduction based on the AP® curriculum and includes rich features that engage students in scientific practice and AP® test preparation; it also highlights careers and research opportunities in biological sciences.