Microbial Inhabitants Of Humans Their Ecology And Role In Health And Disease

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Molecular Biology of the Cell Bruce Alberts 2004
Microbes in Microbial Communities Raghvendra Pratap Singh 2022-01-01 The book overviews the complex interactions amongst the microbes and their possible applications. Emphasis has been made to include a wide spectrum of experimental and theoretical contributions from eminent researchers in the field. Microbial communities are the assemblages of microorganisms of various species which live together in the same environment and continuously interact with each other. The microbial cells in communities display unique phenotypes that affect the survival and reproduction of other cells present around them. These phenotypes constitute the social adaptations that drive the interactions between microbial cells. The interactions, further determine the productivity, stability and the ability of community to resist the environmental perturbations. These microbial communities live with extremely competitive niche and fight for their survival and genetic persistence. But they frequently appear in niche with multifaceted and interactive webs rather than the planktonic nature. This can be within the same species or with different species, or even with diverse genera and families. It either a competitive winner community whereas the “weaker” strain goes extinct or a competitor that coexist with their metabolic secretory potentials or a separator that assigned their own community territorial niches. Sometimes, it can be neutral or tritagonist. These microbial associations within the microbiome provides the foundation for diverse forms of microbial ecology and determined the applied perspectives for agriculture, clinical and industrial sectors. This book will be useful to postgraduate students, researchers from academic as well as industry working in the field of microbial exploration with keen interest in survival factors and mechanism of their survival by various ecological and functional strategies.
Prokaryotic and Eukaryotic Heat Shock Proteins in Infectious Disease A. Graham Pockley 2009-11-10 Prokaryotic and Eukaryotic Heat Shock Proteins in Infectious Disease provides the most current review of the literature relating to the role and influence of heat shock (stress) proteins on the establishment, progression and resolution of infectious disease. Written by leaders in the field of heat shock proteins (HSP) and their biological and immunological properties, the contributors provide a fascinating insight into the complex relationship between, and the involvement of prokaryotic and eukaryotic HSP in disease states. It has been known for some considerable time that heat shock proteins from prokaryotic organisms are immunodominant molecules that are intimately involved in the induction of potential protective inflammatory responses, and this aspect of HSP biology is updated herein. In addition to regulating heat shock protein gene expression, the transcription factor HSF1 also appears to play an important role in regulating immune responses to infection. Heat shock proteins are now known to influence infectious disease processes in a number of diverse ways: they are involved in the propagation of prions, the replication and morphogenesis of viruses, and the resistance of parasites to chemotherapy. These proteins also appear to be important mediators of bacteria-host interactions and inflammation, the latter via interactions with cell surface molecules and structures such as Toll-like receptors and lipid rafts. Heat shock proteins can be expressed on the surface of infected cells, and this is likely to provide a target for the innate immune response. Elevated levels of circulating HSP are present in infectious diseases and these proteins might therefore regulate inflammatory responses to pathogenic challenge on a systemic basis. Heat shock proteins are also implicated in the impact of genital tract infections on the reproductive outcome, as well as in the local and systemic consequences of periodontal disease. Fever-range temperatures can induce the expression of heat shock proteins, and the final chapter in the book examines the influence of fever-range hyperthermia on a variety of cells and the organization of plasma membranes. This book is an essential read for graduates and postgraduates in Biology, pro- and eukaryotic Biochemistry, Immunology, Microbiology, Inflammatory and Infectious Disease, and Pathology.
Advances in Microbial Ecology Bernhard Schink 2000-06-30 Volume 16 of Advances in Microbial Ecology has a difficult history. Nearly halfway through its completion, Gwynfryn Jones had to resign as managing edi tor for health reasons, and he asked me to take over. I want to thank Gwyn for his dedicated work in this publication series, and wish him all the best for the future. After the change in editorship, some authors had to be encouraged on rather short notice to provide their chapters in order to make appearance of this volume possible within a reasonable period of time. Nonetheless, I think that the articles we present with this volume represent an enjoyable collection of up-to-date con tributions to microbial ecology. In my own understanding, microbial ecology com prises the elucidation of microbial activities in natural or semi natural environ ments, including physiology, biochemistry, population dynamics, and interactions with all the biotic and abiotic environmental conditions microbes encounter. This comprises studies on single organisms in defined cultures in an ecological per spective, the analysis of microbial activities in complex environments, as well as the development of concepts for the interactions of microorganisms with the world in which they live. Last but not least, microbial ecology is not an exotic science studied exclusively in remote places untouched by human beings.
The Marine Microbiome Lucas J. Stal 2022 This updated and expanded second edition reviews numerous aspects of the marine microbiome and its possible industrial applications. The marine microbiome is the total of microorganisms and viruses in the ocean and seas and in any connected environment, including the seafloor and marine animals and plants. In the first part of the book, diversity, origin and evolution of the marine microorganisms and viruses are discussed. The microbes presented originate from all three domains of life: Bacteria, Archaea, and Eukarya. The second part sheds some light on the different communities: it describes

marine habitats and how their inhabitants control biogeochemical cycles. The third part finally examines the microbial ocean as a global system and evaluates methods of utilizing marine microbial resources. Adopting a translational approach, the book connects academic research with industrial applications, making it a fascinating read and valuable resource for microbiologists from both domains.

Bacterial Diversity in Sustainable Agriculture Dinesh K. Maheshwari 2014-09-04 The earth's biodiversity is a degree of ecosystem health which is vital to ecology and environmental sustainability. The microbial world is the largest unexplored reservoir. The agro-ecosystem enriched with rhizosphere implicit abundant and species-rich component of microbial diversity. Its global exploration designs a worldwide framework for agricultural sustainability adjoining benefits in its conservation. Agricultural sustainability requires a major share from ecosystem management which is better paid by microbial diversity and conservation. Diversity of bacteria influences plant productivity providing nutrient convenience from soil instead altering per se community and diversity in the rhizosphere where they may influence mechanistic competent and antagonistic micro-flora. The potential species among the diversity are therefore, essential subjective to their maintenance for use around the globe. Microbial population in agro-ecosystem is influenced by stresses, reduce functionality as a component. It is therefore, important to explore secrets of planned strategy so as to unravel the microbial diversity and conservation in agricultural development. Microorganisms are minute, pervasive in nature and alleged as disease host instead tiny recognize as employee of agro-ecosystem, indulge in agricultural development and potential contributor in world of ecological and economical wealth creation. This step pertinently would help to launch scientific motivation needed to support the refrain of microbial diversity and conservation.

Microbial Ecology in Growing Animals W. H. Holzapfel 2005 "Each entry sets the scene for aspects of microbial interactions in the gastrointestinal tract describing previous work in the field, how this area of work is contributing to scientific knowledge, and the potential of this research for the future. This volume does not seek to address these themes in all domesticated animals or in the models systems used to support gastrointestinal research. However we have selected animals, and in some cases non-typical systems, which have contributed to our understanding of the microbial ecology of the growing animal."--Jacket.

Microbial Biofilms Dharumadurai Dhanasekaran 2016-07-13 In the book Microbial Biofilms: Importance and applications, eminent scientists provide an up-to-date review of the present and future trends on biofilm-related research. This book is divided with four subdivisions as biofilm fundamentals, applications, health aspects, and their control. Moreover, this book also provides a comprehensive account on microbial interactions in biofilms, pyocyanin, and extracellular DNA in facilitating Pseudomonas aeruginosa biofilm formation, atomic force microscopic studies of biofilms, and biofilms in beverage industry. The book comprises a total of 21 chapters from valued contributions from world leading experts in Australia, Bulgaria, Canada, China, Serbia, Germany, Italy, Japan, the United Kingdom, the Kingdom of Saudi Arabia, Republic of Korea, Mexico, Poland, Portugal, and Turkey. This book may be used as a text or reference for everyone interested in biofilms and their applications. It is also highly recommended for environmental microbiologists, soil scientists, medical microbiologists, bioremediation experts, and microbiologists working in biocorrosion, biofouling, biodegradation, water microbiology, quorum sensing, and many other related areas. Scientists in academia, research laboratories, and industry will also find it of interest.

Microbes and Enzymes in Soil Health and Bioremediation Ashok Kumar 2019-11-23 Microbial enzymes play a vital role in maintaining soil health and removing pollutants from contaminated land. Soil microflora is closely associated with maintaining soil fertility, and the use of chemical pesticides, fertilizers and other volatile sprays in agriculture threatens the health ofthe microbial population in the soil. Every single particle of healthy soil contains millions of bacteria, which interact with the nutrients available, sustaining the nutrient cycle and making this microflora an essential component of life on earth. How do microbes help in the nutrient cycle? Either by intracellular digestion of macromolecules and converting these into smaller units in their metabolic pathways, or by secreting enzymes into the extracellular environment to facilitate the conversion of complex macromolecules into micro-molecules that can be easily absorbed by other living species. To meet demands for energy and food for the growing global population, it is important to protect agricultural land from contamination and maintain its productivity. Heavy metal ions from contaminated land canenter crops, fish or aquatic organismsvia contaminated water, and theseare then taken up by the human body, where they can accumulate and alter the normal microflora. The microbiological component of the soil is ahighly complex system and is still not fully understood. How do microbes survive in the changing physicochemical environment of soil?. This book helps readers understand the mechanism, various routes of microbialsoil remediation, the interactionsof different genera, and how microbial enzymes support the sustainable restoration of healthy soil.

A History of Infectious Diseases and the Microbial World Lois N. Magner 2009-04-30 In keeping with the goal of this series, A History of Infectious Diseases and the Microbial World provides a broad introductory overview of the history of major infectious diseases, including their impact on different populations, the recognition of specific causative agents, and the development of methods used to prevent, control, and treat them. By stressing the major themes in the history of disease, this book allows readers to relate modern concerns to historical materials. It places modern developments concerning infectious diseases within their historical context, illuminating the relationships between patterns of disease and social, cultural, political, and economic factors. Upon completing this volume, readers will be prepared to answer contemporary questions concerning the threat of newly-emerging infectious diseases, potentially devastating pandemics, and the threat of bioterrorism. A History of Infectious Diseases and the Microbial World offers readers answers to specific questions, as well as the challenge of a narrative that will stimulate their curiosity and encourage them to ask questions about the theory, practice, and assumptions of modern medicine. One will gain a precise understanding of the nature of different kinds of pathogens, the unique mechanisms behind disease transmission , and the means used to control, prevent, and treat infectious disease. Although only a few of these deadly illnesses can be addressed in detail, those that are discussed include: malaria, leprosy, bubonic plague, tuberculosis, syphilis, diphtheria, cholera, yellow fever, poliomyelitis, HIV/AIDS, and influenza.

Microbiology and Aging Steven L. Percival 2008-12-11 This edited volume contains a collection of reviews that highlight the significance of, and the crucial role, that microorganisms play in the human life cycle and considers the microbiology of the host in different regions of the body during the aging process.

The Marine Microbiome Lucas J. Stal 2016-06-03 This book describes the state-of-the-art concerning the 'marine microbiome' and its uses in biotechnology. The first part discusses the diversity and ecology of marine microorganisms and viruses, including all three domains of life: Bacteria, Archaea, and Eukarya. It discusses whether marine microorganisms exist and, if so, why they might be unique. The second part presents selected marine habitats, their inhabitants and how they influence biogeochemical cycles, while the third discusses the utilization of marine microbial resources, including legal aspects, dissemination, and public awareness.

The marine microbiome is the total of microorganisms and viruses in the ocean and seas and in any connected environment, including the seafloor and marine animals and plants. The diversity of microbial life remains unquantified and largely unknown, and could represent a hidden treasure for human society. Accordingly, this book is also intended to connect academics and industry, providing essential information for microbiologists from both fields.

Microbial Ecosystems of Antarctica Warwick F. Vincent 2004-03-11 A structured account of the full range of environments in Antarctica and of the microbial communities that live within them. The author examines the major features of the chemical and physical environment in each habitat, and the influence of these features on the population structure and dynamics of their microbiota. Each chapter considers a specific type of environment, the microbial species that dominate, their community structure and dynamics, and the microbial processes that operate and have been measured in the ecosystem. The chapters conclude with an overview of the ecosystem trophic structure and an introduction to the larger organisms that depend on the microbiota. Separate chapters examine the range of cellular strategies adopted by microorganisms within the Antarctic environment, and the increasing influence of humans on these communities.

Microbiomes of the Built Environment National Academies of Sciences, Engineering, and Medicine 2017-11-06 People's desire to understand the environments in which they live is a natural one. People spend most of their time in spaces and structures designed, built, and managed by humans, and it is estimated that people in developed countries now spend 90 percent of their lives indoors. As people move from homes to workplaces, traveling in cars and on transit systems, microorganisms are continually with and around them. The human-associated microbes that are shed, along with the human behaviors that affect their transport and removal, make significant contributions to the diversity of the indoor microbiome. The characteristics of "healthy" indoor environments cannot yet be defined, nor do microbial, clinical, and building researchers yet understand how to modify features of indoor environmentsâ€"such as building ventilation systems and the chemistry of building materialsâ€"in ways that would have predictable impacts on microbial communities to promote health and prevent disease. The factors that affect the environments within buildings, the ways in which building characteristics influence the composition and function of indoor microbial communities, and the ways in which these microbial communities relate to human health and well-being are extraordinarily complex and can be explored only as a dynamic, interconnected ecosystem by engaging the fields of microbial biology and ecology, chemistry, building science, and human physiology. This report reviews what is known about the intersection of these disciplines, and how new tools may facilitate advances in understanding the ecosystem of built environments, indoor microbiomes, and effects on human health and well-being. It offers a research agenda to generate the information needed so that stakeholders with an interest in understanding the impacts of built environments will be able to make more informed decisions.

Ending the War Metaphor Institute of Medicine 2006-07-09 Infectious diseases have existed longer than us, as long as us, or are relatively newer than us. It may be the case that a disease has existed for many, many years but has only recently begun affecting humans. At the turn of the century the number of deaths caused by infections in the United States had been falling steadily but since the '80s has seen an increase. In the past 30 years alone 37 new pathogens have been identified as human disease threats and 12% of known human pathogens have been classified as either emerging or remerging. Whatever the story, there is currently a "war" on infectious diseases. This war is simply the systematic search for the microbial "cause" of each disease, followed by the development of antimicrobial therapies. The "war" on infectious diseases, however, must be revisited in order to develop a more realistic and detailed picture of the dynamic interactions among and between host organisms and their diverse populations of microbes. Only a fraction of these microbes are pathogens. Thus, in order to explore the crafting of a new metaphor for host-microbe relationships, and to consider how such a new perspective might inform and prioritize biomedical research, the Forum on Microbial Threats of the Institute of Medicine (IOM) convened the workshop, Ending the War Metaphor: The Changing Agenda for Unraveling the Host-Microbe Relationship on March 16-17, 2005. Workshop participants examined knowledge and approaches to learning about the bacterial inhabitants of the human gut, the best known host-microbe system, as well as findings from studies of microbial communities associated with other mammals, fish, plants, soil, and insects. The perspective adopted by this workshop is one that recognizes the breadth and diversity of host-microbe relationships beyond those relative few that result in overt disease. Included in this summary are the reports and papers of individuals participating in the Forum as well as the views of the editors.

The New Science of Metagenomics National Research Council 2007-05-24 Although we can't usually see them, microbes are essential for every part of human life -- indeed all life on Earth. The emerging field of metagenomics offers a new way of exploring the microbial world that will transform modern microbiology and lead to practical applications in medicine, agriculture, alternative energy, environmental remediation, and many others areas. Metagenomics allows researchers to look at the genomes of all of the microbes in an environment at once, providing a "meta" view of the whole microbial community and the complex interactions within it. It's a quantum leap beyond traditional research techniques that rely on studying -- one at a time -- the few microbes that can be grown in the laboratory. At the request of the National Science Foundation, five Institutes of the National Institutes of Health, and the Department of Energy, the National Research Council organized a committee to address the current state of metagenomics and identify obstacles current researchers are facing in order to determine how to best support the field and encourage its success. The New Science of Metagenomics recommends the establishment of a "Global Metagenomics Initiative" comprising a small number of large-scale metagenomics projects as well as many medium- and small-scale projects to advance the technology and develop the standard practices needed to advance the field. The report also addresses database needs, methodological challenges, and the importance of interdisciplinary collaboration in supporting this new field.

Microbial Ecology in States of Health and Disease Institute of Medicine 2014-02-18 Individually and collectively, resident microbes play important roles in host health and survival. Shaping and shaped by their host environments, these microorganisms form intricate communities that are in a state of dynamic equilibrium. This ecologic and dynamic view of host-microbe interactions is rapidly redefining our view of health and disease. It is now accepted that the vast majority of microbes are, for the most part, not intrinsically harmful, but rather become established as persistent, co-adapted colonists in equilibrium with their environment, providing useful goods and services to their hosts while deriving benefits from these host associations. Disruption of such alliances may have consequences for host health, and investigations in a wide variety of organisms have begun to illuminate the complex and dynamic network of interaction - across the spectrum of hosts, microbes, and environmental niches - that influence the formation, function, and stability of host-associated microbial communities. Microbial Ecology in States of Health and Disease is the summary of a workshop convened by the Institute of Medicine's Forum on Microbial Threats in March 2013 to explore the scientific and therapeutic implications of microbial ecology in states of health and disease. Participants explored host-microbe interactions in humans, animals, and plants; emerging insights into how microbes may influence the development and maintenance of states of

health and disease; the effects of environmental change(s) on the formation, function, and stability of microbial communities; and research challenges and opportunities for this emerging field of inquiry.

Microbial Threats to Health Institute of Medicine 2003-08-25 Infectious diseases are a global hazard that puts every nation and every person at risk. The recent SARS outbreak is a prime example. Knowing neither geographic nor political borders, often arriving silently and lethally, microbial pathogens constitute a grave threat to the health of humans. Indeed, a majority of countries recently identified the spread of infectious disease as the greatest global problem they confront. Throughout history, humans have struggled to control both the causes and consequences of infectious diseases and we will continue to do so into the foreseeable future. Following up on a high-profile 1992 report from the Institute of Medicine, Microbial Threats to Health examines the current state of knowledge and policy pertaining to emerging and re-emerging infectious diseases from around the globe. It examines the spectrum of microbial threats, factors in disease emergence, and the ultimate capacity of the United States to meet the challenges posed by microbial threats to human health. From the impact of war or technology on disease emergence to the development of enhanced disease surveillance and vaccine strategies, Microbial Threats to Health contains valuable information for researchers, students, health care providers, policymakers, public health officials. and the interested public.

Role of Microbes in Human Health and Diseases Nar Singh Chauhan 2019-06-05 Microbes are ubiquitous and have ecological interactions with almost all life forms. Likewise, humans invariably engage in host-microbial interactions that could induce short-term or long-term effects. Some of these long-term crossover interactions have allowed successful colonization of microbes within or on the human body, collectively known as the human microbiome or human microbiota. The human microbiome is identified as playing a key role in various physiological processes like digestion, immunity, defense, growth, and development. Any dysbiosis in the human microbiome structure could induce the onset of various metabolic or physiological disorders. Cumulatively, the human microbiome is considered as a virtual human organ that is essential for host survival. Additionally, short-term biological interactions of the host and microbes have exposed microbes to the human cellular system. This exposure could have allowed the microbes to invade human cells for their growth and reproduction-induced onset of various infectious diseases. This book incorporates a number of studies highlighting the role of microbes in human health and diseases.

Can Microbial Communities Regenerate? S. Andrew Inkpen 2022-07-20 By investigating a simple question, a philosopher of science and a molecular biologist offer an accessible understanding of microbial communities and a motivating theory for future research in community ecology. Microorganisms, such as bacteria, are important determinants of health at the individual, ecosystem, and global levels. And yet many aspects of modern life, from the overuse of antibiotics to chemical spills and climate change, can have devastating, lasting impacts on the communities formed by microorganisms. Drawing on the latest scientific research and real-life examples such as attempts to reengineer these communities through microbial transplantation, the construction of synthetic communities of microorganisms, and the use of probiotics, this book explores how and why communities of microorganisms respond to disturbance, and what might lead to failure. It also unpacks related and interwoven philosophical questions: What is an organism? Can a community evolve by natural selection? How can we make sense of function and purpose in the natural world? How should we think about regeneration as a phenomenon that occurs at multiple biological scales? Provocative and nuanced, this primer offers an accessible conceptual and theoretical understanding of regeneration and evolution at the community level that will be essential across disciplines including philosophy of biology, conservation biology, microbiomics, medicine, evolutionary biology, and ecology.

Advances in Microbial Ecology Bernhard Schink 2000-06-30 This book continues the excellent treatment of microbial ecology exhibited in recent volumes in the series. In particular, it looks at marine and aquatic environments and the recent work being done in these fields of ecology. Chapters include such subjects as methane oxidation in rice fields and wetlands, biological phosphorus removal in activated sludge systems, the environmental fate of chiral pollutants, complex adaptive systems, and a chapter on the largest single-celled prokaryote, A. oxaliferum.

The Connections Between Ecology and Infectious Disease Christon J. Hurst 2018-08-30 This book summarizes current advances in our understanding of how infectious disease represents an ecological interaction between a pathogenic microorganism and the host species in which that microbe causes illness. The contributing authors explain that pathogenic microorganisms often also have broader ecological connections, which can include a natural environmental presence; possible transmission by vehicles such as air, water, and food; and interactions with other host species, including vectors for which the microbe either may or may not be pathogenic. This field of science has been dubbed disease ecology, and the chapters that examine it have been grouped into three sections. The first section introduces both the role of biological community interactions and the impact of biodiversity on infectious disease. In turn, the second section considers those diseases directly affecting humans, with a focus on waterborne and foodborne illnesses, while also examining the critical aspect of microbial biofilms. Lastly, the third section presents the ecology of infectious diseases from the perspective of their impact on mammalian livestock and wildlife as well as on humans. Given its breadth of coverage, the volume offers a valuable resource for microbial ecologists and biomedical scientists alike.

Alcamo's Fundamentals of Microbiology Jeffrey C. Pommerville 2012-01-15 Ideal for allied health and pre-nursing students, Alcamo's Fundamentals of Microbiology: Body Systems, Second Edition, retains the engaging, student-friendly style and active learning approach for which award-winning author and educator Jeffrey Pommerville is known. Thoroughly revised and updated, the Second Edition presents diseases, complete with new content on recent discoveries, in a manner that is directly applicable to students and organized by body system. A captivating art program includes more than 150 newly added and revised figures and tables, while new feature boxes, Textbook Cases, serve to better illuminate key concepts. Pommerville's acclaimed learning design format enlightens and engages students right from the start, and new chapter conclusions round out each chapter, leaving readers with a clear understanding of key concepts.

The Hologenome Concept: Human, Animal and Plant Microbiota Eugene Rosenberg 2014-01-31 Groundbreaking research over the last 10 years has given rise to the hologenome concept of evolution. This concept posits that the holobiont (host plus all of its associated microorganisms) and its hologenome (sum of the genetic information of the host and its symbiotic microorganisms), acting in concert, function as a unique biological entity and therefore as a level of selection in evolution. All animals and plants harbor abundant and diverse microbiota, including viruses. Often the amount of symbiotic microorganisms and their combined genetic information far exceed that of their host. The microbiota with its microbiome, together with the host genome, can be transmitted from one generation to the next and thus propagate the unique properties of the holobiont. The microbial symbionts and the host interact in a cooperative way that affects the health of the holobiont within its environment. Beneficial microbiota protects against pathogens, provides essential nutrients, catabolizes complex polysaccharides, renders harmful chemicals inert, and

contributes to the performance of the immune system. In humans and animals, the microbiota also plays a role in behavior. The sum of these cooperative interactions characterizes the holobiont as a unique biological entity. Genetic variation in the hologenome can be brought about by changes in either the host genome or the microbial population genomes (microbiome). Evolution by cooperation can occur by amplifying existing microbes, gaining novel microbiota and by acquiring microbial and viral genes. Under environmental stress, the microbiome can change more rapidly and in response to more processes than the host organism alone and thus influences the evolution of the holobiont. Prebiotics, probiotics, synbiotics and phage therapy are discussed as applied aspects of the hologenome concept.

Microbial Ecology Larry L. Barton 2011-10-14 This book covers the ecological activities of microbes in the biosphere with an emphasis on microbial interactions within their environments and communities In thirteen concise and timely chapters, Microbial Ecology presents a broad overview of this rapidly growing field, explaining the basic principles in an easy-to-follow manner. Using an integrative approach, it comprehensively covers traditional issues in ecology as well as cutting-edge content at the intersection of ecology, microbiology, environmental science and engineering, and molecular biology. Examining the microbial characteristics that enable microbes to grow in different environments, the book provides insights into relevant methodologies for characterization of microorganisms in the environment. The authors draw upon their extensive experience in teaching microbiology to address the latest hot-button topics in the field, such as: Ecology of microorganisms in natural and engineered environments Advances in molecular-based understanding of microbial phylogeny and interactions Microbially driven biogeochemical processes and interactions among microbial populations and communities Microbial activities in extreme or unusual environments Ecological studies pertaining to animal, plant, and insect microbiology Microbial processes and interactions associated with environmental pollution Designed for use in teaching, Microbial Ecology offers numerous special features to aid both students and instructors, including: Information boxes that highlight key microbial ecology issues "Microbial Spotlights" that focus on how prominent microbial ecologists became interested in microbial ecology Examples that illustrate the role of bacterial interaction with humans Exercises to promote critical thinking Selected reading lists Chapter summaries and review questions for class discussion Various microbial interactions and community structures are presented through examples and illustrations. Also included are mini case studies that address activities of microorganisms in specific environments, as well as a glossary and key words. All these features make this an ideal textbook for graduate or upper-level undergraduate students in biology, microbiology, ecology, or environmental science. It also serves as a highly useful reference for scientists and environmental professionals. PowerPoint slides of figures from the book are available for download at: ftp://ftp.wiley.com/public/sci_tech_med/microbial_ecology

Microbial Evolution and Co-Adaptation Institute of Medicine 2009-05-10 Dr. Joshua Lederberg - scientist, Nobel laureate, visionary thinker, and friend of the Forum on Microbial Threats - died on February 2, 2008. It was in his honor that the Institute of Medicine's Forum on Microbial Threats convened a public workshop on May 20-21, 2008, to examine Dr. Lederberg's scientific and policy contributions to the marketplace of ideas in the life sciences, medicine, and public policy. The resulting workshop summary, Microbial Evolution and Co-Adaptation, demonstrates the extent to which conceptual and technological developments have, within a few short years, advanced our collective understanding of the microbiome, microbial genetics, microbial communities, and microbe-host-environment interactions.

What You Need to Know about Infectious Disease Madeline Drexler

The Oral Microbiome in an Ecological Perspective Egija Zaura 2015-07-27 The oral cavity harbors an immense diversity of microorganisms, including bacteria, fungi, archaea, protozoa and viruses. At health, oral microbial community is thought to be in a state of homeostasis, even after numerous perturbations (e.g., toothbrushing, food intake) a day. The breach in this homeostasis can occur for instance if the perturbations become too excessive (e.g., frequent carbohydrate intake leading to acidification of the community) or the host is compromised (e.g., inadequate immune response resulting in persistent inflammation of periodontal tissue). Aggressive antimicrobial therapy (e.g., antibiotics in case of periodontal disease or preventive antibiotic therapy before and after dental extractions) is commonly applied with all the negative consequences of this approach. So far little is known on the interplay between the environmental, host and microbial factors in maintaining an ecological balance. What are the prerequisites for a healthy oral ecosystem? Can we restore an unbalanced oral microbiome? How stable is the oral microbiome through time and how robust it is to external perturbations? Gaining new insights in the ecological factors sustaining oral health will lead to conceptually new therapies and preventive programs. Recent advances in high throughput technologies have brought microbiology as a science to a new era, allowing an open-ended approach instead of focusing on few opportunistic pathogens. With this topic we would like to integrate the current high-throughput ‘omics’ tools such as metagenomics, metatranscriptomics, metaproteomics or metabolomics with biochemical, physiological, genetic or clinical parameters within the oral microbial ecosystem. We aim to address questions underlying the regulation of the ecological balance in the oral cavity by including the following areas: • Ecology of oral microbiome at health • Ecology of oral microbiome under oral diseases • Ecology of oral microbiome during non-oral diseases • Shifts in the oral microbiome by therapeutic approaches (e.g., antimicrobials, replacement therapy, pre- and probiotics) • Modeling of oral ecological shifts (e.g., animal models, in vitro microcosm models) • Complex inter- and intra-kingdom interactions (e.g., bacterial-fungal-host) related to oral ecology • Environmental (e.g., diet, tobacco), host-related (e.g., immune response, saliva composition and flow) and biotic (e.g., bacterial competition) factors influencing oral ecology • Geographic variation in oral microbial ecology and diversity

Fundamentals of Microbiology Jeffrey C. Pommerville 2013-01-09 The Tenth Edition of Jeffrey Pommerville's best-selling, award-winning classic text Fundamentals of Microbiology provides nursing and allied health students with a firm foundation in microbiology. Updated to reflect the Curriculum Guidelines for Undergraduate Microbiology as recommended by the American Society for Microbiology, the fully revised tenth edition includes all-new pedagogical features and the most current research data. This edition incorporates updates on infectious disease and the human microbiome, a revised discussion of the immune system, and an expanded Learning Design Concept feature that challenges students to develop critical-thinking skills. Important Notice: The digital edition of this book is missing some of the images or content found in the physical edition.

Marine Microbiology Colin B. Munn 2019-11-26 The third edition of this bestselling text has been rigorously updated to reflect major new discoveries and concepts since 2011, especially progress due to extensive application of high-throughput sequencing, single cell genomics and analysis of large datasets. Significant advances in understanding the diversity and evolution of bacteria, archaea, fungi, protists, and viruses are discussed and their importance in marine processes is explored in detail. Now in full colour throughout, all chapters have been significantly expanded, with many new diagrams, illustrations and boxes to aid students’ interest and understanding. Novel pedagogy is designed to encourage students to explore current high-profile research topics. Examples

include the impacts of rising CO2 levels on microbial community structure and ocean processes, interactions of microbes with plastic pollution, symbiotic interactions, and emerging diseases of marine life. This is the only textbook addressing such a broad range of topics in the specific area of marine microbiology, now a core topic within broader Marine Science degrees. A Companion Website provides additional online resources for instructors and students, including a summary of key concepts and terminology for each chapter, links to further resources, and flashcards to aid self-assessment.

Microbiome-Host Interactions D. Dhanasekaran 2021-03-31 Microbiota are a promising and fascinating subject in biology because they integrate the microbial communities in humans, animals, plants, and the environment. In humans, microbiota are associated with the gut, skin, and genital, oral, and respiratory organs. The plant microbial community is referred to as "holobiont," and it is influential in the maintenance and health of plants, which themselves play a role in animal health and the environment. The contents of Microbiome-Host Interactions cover all areas as well as new research trends in the fields of plant, animal, human, and environmental microbiome interactions. The book covers microbiota in polar soil environments, in health and disease, in Caenorhabditis elegans, and in agroecosystems, as well as in rice root and actinorhizal root nodules, speleothems, and marine shallow-water hydrothermal vents. Moreover, this book provides comprehensive accounts of advanced next-generation DNA sequencing, metagenomic techniques, high-throughput 16S rRNA sequencing, and understanding nucleic acid sequence data from fungal, algal, viral, bacterial, cyanobacterial, actinobacterial, and archaeal communities using QIIME software (Quantitative Insights into Microbial Ecology). FEATURES Summarizes recent insight in microbiota and host interactions in distinct habitats, including Antarctic, hydrothermal vents, speleothems, oral, skin, gut, feces, reproductive tract, soil, root, root nodules, forests, and mangroves Illustrates the high-throughput amplicon sequencing, computational techniques involved in the microbiota analysis, downstream analysis and visualization, and multivariate analysis commonly used for microbiome analysis Describes probiotics and prebiotics in the composition of the gut microbiota, skin microbiome impact in dermatologic disease prevention, and microbial communities in the reproductive tract of humans and animals Presents information in a reachable way for students, teachers, researchers, microbiologists, computational biologists, and other professionals who are interested in strengthening or enlarging their knowledge about microbiome analysis with next-generation DNA sequencing in the different branches of the sciences

Microbial Inhabitants of Humans Michael Wilson 2005 An advanced text on microorganisms indigenous to humans of key importance in health and disease.

The Social Ecology of Infectious Diseases Kenneth H. Mayer 2011-04-28 Social Ecology of Infectious Diseases explores how human activities enable microbes to disseminate and evolve, thereby creating favorable conditions for the diverse manifestations of communicable diseases. Today, infectious and parasitic diseases cause about one-third of deaths and are the second leading cause of morbidity and mortality. The speed that changes in human behavior can produce epidemics is well illustrated by AIDS, but this is only one of numerous microbial threats whose severity and spread are determined by human behaviors. In this book, forty experts in the fields of infectious diseases, the life sciences and public health explore how demography, geography, migration, travel, environmental change, natural disaster, sexual behavior, drug use, food production and distribution, medical technology, training and preparedness, as well as governance, human conflict and social dislocation influence current and likely future epidemics. Provides essential understanding of current and future epidemics Presents a crossover perspective for disciplines in the medical and social sciences and public policy, including public health, infectious diseases, population science, epidemiology, microbiology, food safety, defense preparedness and humanitarian relief Creates a new perspective on ecology based on the interaction of microbes and human activities

The Social Biology of Microbial Communities Institute of Medicine 2013-01-10 Beginning with the germ theory of disease in the 19th century and extending through most of the 20th century, microbes were believed to live their lives as solitary, unicellular, disease-causing organisms . This perception stemmed from the focus of most investigators on organisms that could be grown in the laboratory as cellular monocultures, often dispersed in liquid, and under ambient conditions of temperature, lighting, and humidity. Most such inquiries were designed to identify microbial pathogens by satisfying Koch's postulates.3 This pathogen-centric approach to the study of microorganisms produced a metaphorical "war" against these microbial invaders waged with antibiotic therapies, while simultaneously obscuring the dynamic relationships that exist among and between host organisms and their associated microorganisms-only a tiny fraction of which act as pathogens. Despite their obvious importance, very little is actually known about the processes and factors that influence the assembly, function, and stability of microbial communities. Gaining this knowledge will require a seismic shift away from the study of individual microbes in isolation to inquiries into the nature of diverse and often complex microbial communities, the forces that shape them, and their relationships with other communities and organisms, including their multicellular hosts. On March 6 and 7, 2012, the Institute of Medicine's (IOM's) Forum on Microbial Threats hosted a public workshop to explore the emerging science of the "social biology" of microbial communities. Workshop presentations and discussions embraced a wide spectrum of topics, experimental systems, and theoretical perspectives representative of the current, multifaceted exploration of the microbial frontier. Participants discussed ecological, evolutionary, and genetic factors contributing to the assembly, function, and stability of microbial communities; how microbial communities adapt and respond to environmental stimuli; theoretical and experimental approaches to advance this nascent field; and potential applications of knowledge gained from the study of microbial communities for the improvement of human, animal, plant, and ecosystem health and toward a deeper understanding of microbial diversity and evolution. The Social Biology of Microbial Communities: Workshop Summary further explains the happenings of the workshop.

The Handbook of Microbial Bioresources Vijai Kumar Gupta 2016-06-27 Microbial technology plays an integral role in the biotechnology, bioengineering, biomedicine/biopharmaceuticals and agriculture sector. This book provides a detailed compendium of the methods, biotechnological routes, and processes used to investigate different aspects of microbial resources and applications. It covers the fundamental and applied aspects of microorganisms in the health, industry, agriculture and environmental sectors, reviewing subjects as varied and topical as pest control, health and industrial developments and animal feed.

The Ecology of Predation at the Microscale Edouard Jurkevitch 2020-06-29 The book will provide an update on our understanding of predator-prey through the prism of ecology, physiology, molecular biology, and mathematical modelling. The integration of these different perspectives while focusing on the microbial realm will highlight the importance of scale in ecological interactions, and their importance in applications. This book should thereby contribute to theoretical as well as to applied ecologists and microbiologists. Furthermore, the detailed but amenable chapters could serve as the basis of teaching advanced courses in (microbial) ecology and environmental microbiology.This work is a collection of articles that discuss microbial predation from a variety of perspectives. It provides the readers a concise resource describing factors that are critical for several different predatory microbes, including

Myxobacterium spp. and Bdellovibrio-and-like organisms (BALOs), including the mechanisms involved, ecological conditions that adversely impact it and potential applications in aquaculture and bioproduction. The first half of this collection focuses more on ecological aspects of predation, with in-depth discussions on “wolf pack” predators, the presence and activities of predators in waste-water treatment plants and the role of intraguild predatory relationships, i.e., when two different predators are competing for a single prey but also interact with one another. The reader will gain a deeper understanding of the predatory mechanisms involved and their ecological roles. In the latter half, emphasis is given more to the application and limitations of predators. In addition to discussing secondary metabolite production within different microbial predators, the readers will also learn how predators are being used to purify secondary metabolites from prey. This section also discusses the expanding and promising role of predation in aquaculture, focusing on the application of predators to reduce pathogenic populations, but includes some important caveats for young researchers to consider and follow when working with Bdellovibrio. This work is written for both experienced researchers already in the field and for young scientists who are captivated by the thought of predation at the microscale and its growing importance within a wide-array of fields.

Management of Microbial Resources in the Environment Abdul Malik 2013-02-26 This volume details the exploration, collection, characterization, evaluation and conservation of microbes for sustainable utilization in the development of the global as well as national economies, e.g. in agriculture, ecosystems, environments, industry and medicine. Many research institutes and universities all over the world carry out microbiological and biotechnological research, which generates substantial genomic resources such as cDNA libraries, gene constructs, promoter regions, transgenes and more valuable assets for gene discovery and transgenic product development. This work provides up-to-date information on the management of microbial resources in the environment. It also covers the ecology of microorganisms in natural and engineered environments. In trying to understand microbial interactions it further focuses on genomic, metagenomic and molecular advances, as well as on microbial diversity and phylogeny; ecological studies of human, animal and plant microbiology and disease; microbial processes and interactions in the environment; and key technological advances. Though not intended to serve as an encyclopedic review of the subject, the various chapters investigate both theoretical and practical aspects and provide essential basic information for future research to support continued development.?

Microbial Ecology of Endophytic Bacteria in Zea Species as Influenced by Plant Genotype, Seed Origin, and Soil Environment David Morris Johnston Monje 2011

Human Microbial Ecology Michael J. Hill 2020-08-11 The aim of this comprehensively written volume is to provide a baseline of information on the normal microflora at various sites in the body. It focuses on the mouth, upper digestive tract, large intestine, skin, and urinogenital tract. Written in an easy-to-read format, this book highlights the level of detail available. For example, it explains that in the mouth and colon the data are extremely detailed and good quantitative information is available on large numbers of bacterial species. This work analyzes the similarities and differences between the microfloras of the various "internal" surfaces, and discusses the clear value of good taxonomy. It focuses on problems and extended research in the progress at other sites. Because this work researches the advances and discoveries made in specific areas of human microbial ecology, it is an ideal source for all who are involved in microbiology, bacteriology, and infectious diseases.

Comparison of Gut Microbiomes in Laboratory Cultured Sea Urchins Revealing Selective Attributes of Microbial Composition Based Upon Their Feed and Surroundings Joseph Antoine Hakim 2015 Bacteria residing in the gastrointestinal tract play important roles in digestive physiology and host health. The advent of NextGen sequencing and bioinformatics has made it possible to establish taxonomic profiles with highest coverage, and map these microbes in the gut ecosystem. Although extensively studied in the context of human health, understanding the microbial profiles associated with other organisms will elucidate the roles of the microbial inhabitants to their respective hosts and environment. The microbes of the sea urchin gut have been linked to digestion, processing, and extraction of nutrients from ingesta while within the gut, and have also been implicated in driving molecular transitions of undigested feed components post egestion. Additionally, the sea urchin may be aquacultured in the laboratory for use as model organisms, and understanding the membership and structure of the microbial profiles associated with the digestive tract is imperative for the comprehensive understanding of the health of the organism. To establish the microbial profiles of the sea urchin gut, community DNA was extracted from the gut and pharynx tissues, the gut digesta and egested fecal pellets, as well as the tank water and feed. NextGen amplicon sequencing of the V4 segment of the bacterial 16S rRNA gene, followed by bioinformatics tools were implemented. The results indicate Proteobacteria to be the dominant taxa of the gut microbiome, with members of Campylobacterales dominating in the gut tissue. Oligotyping analysis followed by BLAST determined the Campylobacterales sequence oligotype to be related to Arcobacter species (identity > 91%), from the likely source of the tank water and feed. In the gut digesta and egested fecal pellets, Vibrio was found to be dominant. This study is expected to offer the baseline microbial profile of the sea urchin, L. variegatus, as it may pertain to the digestive physiology of the organism, the ecological impact of the microbe-laden egested fecal pellets onto the various marine trophic levels, and the informed culturability of the healthy sea urchin as a model organism.