



# Protein Secretion And Export In Bacteria

**Dongsheng Zhou, Shihua Wang, Xihui  
Shen**



## **Protein Secretion And Export In Bacteria:**

**Protein Secretion and Export in Bacteria** Henry C. Wu, Phang C. Tai, 2012-02-14 The last decade has witnessed rapid progress in our understanding of the mechanisms of protein export and secretion in both prokaryotic and eukaryotic cells. Studies of protein secretion across the membranes of the rough endoplasmic reticulum have led to the formulation of the now classic signal hypothesis which has stimulated many discussions and new ideas and the identification of the signal recognition particle as an organelle in the initiation of the export process. However, more recent work pertaining to intragenic information related to targeting specific proteins for either secretion or membrane localization, the energetics of protein secretion, the timing of synthesis versus the initiation of export, structural requirements for the processing of precursor proteins, and the identification of the processing enzymes, signal peptidases, has been the result of a combined biochemical and genetic approach to the study of protein localization in bacteria. While reviews on the biochemistry and genetics of protein secretion have appeared frequently in recent years, this book attempts to summarize the current status and the future perspectives of this rapidly moving field in a single volume. Topics covered in this book include the genetics of protein secretion in *E. coli*, biochemical analysis of protein export in vitro, signal peptidases, excretion of colicins and hemolysin in *E. coli*, protein secretion in *Bacillus*, and protein secretion cloning vectors.

*Protein Secretion in Bacteria* Maria Sandkvist, Eric Cascales, Peter J. Christie, 2019-09-01 Protein transport into and across membranes is a fundamental process in bacteria that touches upon and unites many areas of microbiology including bacterial cell physiology, adhesion and motility, nutrient scavenging, intrabacterial signaling and social behavior, toxin deployment, interbacterial antagonism and collaboration, host invasion and disruption, and immune evasion. A broad repertoire of mechanisms and macromolecular machines are required to deliver protein substrates across bacterial cell membranes for intended effects. Some machines are common to most if not all bacteria, whereas others are specific to Gram-negative or Gram-positive species or species with unique cell envelope properties such as members of Actinobacteria and Spirochetes. *Protein Secretion in Bacteria*, authored and edited by an international team of experts, draws together the many distinct functions and mechanisms involved in protein translocation in one concise tome. This comprehensive book presents updated information on all aspects of bacterial protein secretion encompassing individual secretory systems Sec, Tat, and T1SS through the newly discovered T9SS. Mechanisms, structures, and functions of bacterial secretion systems, lipoprotein sorting pathways, outer membrane vesicles, and the sortase system. Structures and roles of surface organelles including flagella, pili, and curli. Emerging technologies and translational implications. *Protein Secretion in Bacteria* serves as both an introductory guide for students and postdocs and a ready reference for seasoned researchers whose work touches on protein export and secretion. This volume synthesizes the diversity of mechanisms of bacterial secretion across the microbial world into a digestible resource to stimulate new research, inspire continued identification and characterization of novel systems, and bring about new ways to manipulate these systems.

for biotechnological preventative and therapeutic applications

**Protein and Sugar Export and Assembly in Gram-positive Bacteria** Fabio Bagnoli, Rino Rappuoli, 2017-05-02 This book focuses on the envelope of Gram positive bacteria including its composition the latest discoveries in the mechanisms behind its assembly and its role in pathogenesis Furthermore new applications in biotechnology and vaccine development involving these bacteria are discussed in detail This concise volume consists of eleven chapters by prominent experts in the field which review the latest findings and current state of knowledge on a range of diverse yet interlinked aspects This book is written for all researchers clinicians and technicians engaged in basic or applied science projects on Gram positive bacteria

**Protein Export and Secretion Among Bacterial Pathogens** Sophie Bleves, Romé Voulhoux, Bérangère Ize, Thibault Géry Sana, Denise Monack, 2020-02-27

*The Comprehensive Sourcebook of Bacterial Protein Toxins* Joseph E. Alouf, Daniel Ladant, Michel R. Popoff, 2015-05-29

The Comprehensive Sourcebook of Bacterial Protein Toxins Fourth Edition contains chapters written by internationally known and well respected specialists This book contains chapters devoted to individual toxins as well as chapters that consider the different applications of these toxins Considerable progress has been made in understanding the structure function interaction and trafficking into cells as well as mechanism of action of toxins Bacterial toxins are involved in the pathogenesis of many bacteria some of which are responsible for severe diseases in human and animals but can also be used as tools in cell biology to dissect cellular processes or used as therapeutic agents Novel recombinant toxins are already proposed in the treatment of some diseases as well as new vaccines Alternatively certain toxins are also considered as biological weapons or bioterrorism threats Given the multifaceted aspects of toxin research and the multidisciplinary approaches adopted toxins are of great interest in many scientific areas from microbiology virology cell biology to biochemistry and protein structure This new edition is written with a multidisciplinary audience in mind and contains 5 new chapters that reflect the latest research in this area Other chapters have been combined deleted and fully revised as necessary to deliver relevant and valuable content Descriptions of relevant toxins as well as representative toxins of the main bacterial toxin families to allow for a better comparison between them Focused chapters on toxin applications and common properties or general features of toxins

Bacterial Energetics Terry Krulwich, 2012-12-02 Bacterial Energetics deals with bacterial energetics and the molecular basis of how ions move between and within energy transducing molecules Topics covered range from respiration driven proton pumps and primary sodium pumps to light driven primary ionic pumps bacterial transport ATPases and bacterial photosynthesis Sodium coupled cotransport and ion exchange systems in prokaryotes are also considered This volume is comprised of 17 chapters and begins with an analysis of the pumps and processes that establish electrochemical ion gradients across bacterial membranes followed by a discussion on the major types of bioenergetic work that utilize these gradients The energetics of periplasmic transport systems chemolithotrophs methanogens and protein insertion and translocation into or across membranes are also examined along with bioenergetics

in extreme environments such as high pressure and high temperature environments energetic problems of bacterial fermentations energetics of bacterial motility and energetics of the bacterial phosphotransferase system in sugar transport and the regulation of carbon metabolism This book should be of interest to molecular biologists and biochemists

**Virulence Mechanisms of Bacterial Pathogens** Indira T. Kudva, Nancy A. Cornick, Paul J. Plummer, Qijing Zhang, Tracy L. Nicholson, John P. Bannantine, Bryan H. Bellaire, 2020-07-10 Ground breaking overview of an enduring topic Despite the use of antibiotics bacterial diseases continue to be a critical issue in public health and bacterial pathogenesis remains a tantalizing problem for research microbiologists This new edition of Virulence Mechanisms of Bacterial Pathogens broadly covers the knowledge base surrounding this topic and presents recently unraveled bacterial virulence strategies and cutting edge therapies A team of editors led by USDA scientist Indira Kudva compiled perspectives from experts to explain the wide variety of mechanisms through which bacterial pathogens cause disease the host interface host cell enslavement and bacterial communication secretion defenses and persistence A collection of reviews on targeted therapies rounds out the seven sections of this unique book The new edition provides insights into some of the most recent advances in the area of bacterial pathogenesis including how metabolism shapes the host pathogen interface interactions across species and genera mechanisms of the secretion systems evasion survival and persistence mechanisms new therapies targeting various adaptive and virulence mechanisms of bacterial pathogens Written to promote discussion extrapolation exploration and multidimensional thinking Virulence Mechanisms of Bacterial Pathogens serves as a textbook for graduate courses on bacterial pathogenesis and a resource for specialists in bacterial pathogenicity such as molecular biologists physician scientists infectious disease clinicians dental scientists veterinarians molecular biologists industry researchers and technicians

*Bacterial Physiology* Walid El-Sharoud, 2007-12-07 The application of new molecular methodologies in the study of bacterial behavior and cell architecture has enabled new revolutionary insights and discoveries in these areas This new text presents recent developments in bacterial physiology that are highly relevant to a wide range of readership including those interested in basic and applied knowledge Its chapters are written by international scientific authorities at the forefront of the subject The value of this recent knowledge in bacterial physiology is not only restricted to fundamental biology It also extends to biotechnology and drug discovery disciplines

*Regulation of Gene Expression in Enteropathogenic Bacteria, Volume II* Dongsheng Zhou, Shihua Wang, Xihui Shen, 2021-01-22 Following the success of this Research Topic <http://journal.frontiersin.org/researchtopic/3298> regulation of gene expression in enteropathogenic bacteria we are happy to launch a second edition of the project Pathogenic bacteria have evolved numerous strategies to survive in and to attack hosts which can be reflected by transcriptional and posttranscriptional changes in specific genes especially including those encoding virulence determinants Regulation of gene expression by regulatory proteins and non coding RNAs enables the pathogens to adapt their metabolic needs and to coordinately express virulence determinants during different

stages of infection      **Genetics and Molecular Biology of Anaerobic Bacteria** Madeleine Sebald, 2012-12-06 The field of bacterial genetics has been restricted for many years to *Escherichia coli* and a few other genera of aerobic or facultatively anaerobic bacteria such as *Pseudomonas*, *Bacillus* and *Salmonella*. The prevailing view up to recent times has been that anaerobic bacteria are interesting organisms but nothing is known about their genetics. To most microbiologists anaerobic bacteria appeared as a sort of distant domain reserved for occasional intrusions by taxonomists and medical microbiologists. By the mid 1970s knowledge of the genetics and molecular biology of anaerobes began to emerge and then developed rapidly but also in this. This was the result of advances in molecular biology techniques, particularly because of improvements in basic techniques for culturing anaerobes and for understanding their biochemistry and other areas of interest. Investigations in this field were also stimulated by a renewal of interest in their ecology, their role in pathology and in biotransformations and in the search for alternative renewable sources of energy. The initial idea for this book came from Thomas D Brock. When Dr Brock requested my opinion about two years ago on the feasibility of publishing a book on the genetics of anaerobic bacteria as a part of the Brock Springer Series in Contemporary Bioscience, I answered positively but I was apprehensive about assuming the role of editor. However I was soon reassured by the enthusiastic commitment of those I approached to contribute. Eventually thanks to the caring cooperation of the contributors the task became relatively easy.

*Bacterial and Eukaryotic Porins* Roland Benz, 2006-03-06 This first book dedicated to the topic relates the known physiological functions of porins to their molecular structure and mechanism as documented by various in vitro and in vivo methods including the generation of null mutants in mice. For the first time it brings together biophysical evidence with studies performed in a cellular context, presenting a unified picture of the fundamental importance of porins for cellular function. With 16 contributions by an interdisciplinary team of leading porin researchers, this reference is essential reading for every molecular or structural biologist with an interest in this essential protein family.

**Protein Secretion Pathways in Bacteria** B. Oudega, 2012-12-06 For bacteria the times are changing. The genomes of over 60 different bacteria have now been sequenced and we know a lot about the important research organism *Escherichia coli*, the important industrial organism *Bacillus subtilis* and about important plant and human pathogens. It will not take long before we know all the gene products and their functions of a few of these bacteria. Some of us already begin to think about a digital model *E. coli* or *Bacillus* cell. For that end we need to know all the physiological activities and metabolic routes of the cell. But in addition we like to know how things work at the molecular level and how protein and membranes as well as other macromolecular structures work together to carry out specific cell functions. *Protein Secretion Pathways in Bacteria* describes all the known folding and targeting routes of inner and outer membrane proteins as well as of proteins that are secreted by several specific export routes. The book gives detailed molecular information about the structures that are important for the different mechanisms involved. This is a valuable contribution to the understanding of how rather simple and yet complex bacterial cells work.

## **Filamentous Bacteriophage in Bio/Nano/Technology, Bacterial Pathogenesis and Ecology** Jasna

Rakonjac, Bhabatosh Das, Ratmir Derda, 2017-02-16 Filamentous phage genus Inovirus infect almost invariably Gram negative bacteria. They are distinguished from all other bacteriophage not only by morphology but also by the mode of their assembly a secretion like process that does not kill the host. Classic Escherichia coli filamentous phage Ff, fd and M13 are used in display technology and bio nano technology whereas filamentous phage in general have been put to use by their bacterial hosts for adaptation to environment pathogenesis biofilm formation horizontal gene transfer and modulating genome stability. Many filamentous phage have a symbiotic life style that is often manifested by inability to form plaques preventing their identification by standard phage hunting techniques while the absence or very low sequence conservation between phage infecting different species often complicates their identification through bioinformatics. Nevertheless the number of discovered filamentous phage is increasing rapidly along with realization of their significance. Temperate filamentous phage whose genomes are integrated into the bacterial chromosome of pathogenic bacteria often modulate virulence of the host. The Vibrio cholerae phage CTXf genome encodes cholera toxin whereas many filamentous prophage influence virulence without encoding virulence factors. The nature of their effect on the bacterial pathogenicity and overall physiology is the next frontier in understanding intricate relationship between the filamentous phage and their hosts. Phage display has been widely used as a combinatorial technology of choice for discovery of therapeutic antibodies and peptide leads that have been applied in the vaccine design diagnostics and drug development or targeting over the past thirty years. Virion proteins of filamentous phage are integral membrane proteins prior to assembly hence they are ideal for display of bacterial surface and secreted proteins. The use of this technology at the scale of microbial community has potential to identify host interacting proteins of uncultivable or low represented community members. Recent applications of Ff filamentous phage extend into protein evolution synthetic biology and nanotechnology. In many applications phage serves as a monodisperse long aspect nano scaffold of well defined shape. Chemical or genetic modifications of this scaffold are used to introduce the necessary functionalities such as fluorescent labels ligands that target specific proteins or peptides that promote formation of inorganic or organic nanostructures. We anticipate that the future holds development of new strategies for particle assembly site specific multi functional modifications and improvement of existing modification strategies. These improvements will render the production of filamentous phage templated materials safe and affordable allowing their applications outside of the laboratory.

**Gene and Protein Evolution** Jean-Nicolas Volff, 2007-01-01 Our way of understanding evolution has changed completely with the era of genomics particularly since the emergence of comparative genomics a discipline allowing the analysis of complete genomes and biological processes over vast periods of time. In this volume internationally recognized experts present and discuss an update of the evolutionary processes at the onset of organismal diversification and complexity and review the mechanisms leading to the acquisition of new traits and functions. Different levels of evolution are considered

from internal modules in genes and proteins to interactomes and biological networks with integration of the influence of both the genomic environment and the ecological context Particular emphasis will be given to the origin of novel genes and gene functions as well as to the evolutionary impact of the duplication of genetic information with several chapters devoted to transposable elements Providing an excellent update on gene and protein evolution this book will be appreciated by researchers in biology and medicine biology teachers and anyone interested in evolution and genomics Publisher s description *Molecular Mechanisms of Bacterial Virulence* Clarence I. Kado,Jorge H. Crosa,1993-12-31 Host recognition and attachment mechanisms Pathogen ingress and invasive mechanisms Elaboration of pathogenic factors Regulation of virulence genes and signal transduction Mechanisms against host defenses *Biological Rotary Nanomotors* Michael Manson,Tom Duncan,Pushkar Lele,Jun Liu,Beiyan Nan,2023-02-09 **Bacterial Pathogenesis, Part C: Identification, Regulation and Function of Virulence Factors**, 2002-12-05 The critically acclaimed laboratory standard for more than forty years *Methods in Enzymology* is one of the most highly respected publications in the field of biochemistry Since 1955 each volume has been eagerly awaited frequently consulted and praised by researchers and reviewers alike Now with more than 300 volumes all of them still in print the series contains much material still relevant today truly an essential publication for researchers in all fields of life sciences Key Features Presents alternatives to mammalian model systems Discusses virulence and essential gene identification Defines global gene expression *Pathogenic Escherichia Coli in Latin America* Alfredo G. Torres,2010 Pathogenic *Escherichia coli* are known to be a common cause of diarrheal disease a common cause of frequently occurring bacterial infections in children and adults in developing countries It poses a significant problem in Latin America Pathogenic *Escherichia coli* in Latin America presents current information on understanding pathogenic *E coli* in Latin America and outlines prospects for future research in this region It features a unique comprehensive analysis of the most common categories of *E coli* associated with diarrheal illness in Latin America The aim of this book is to help epide *Bacterial and Archaeal Motility* Tohru Minamino,Makoto Miyata,Keiichi Namba,2023-02-26 This detailed volume presents cutting edge research protocols to study the structure and dynamics of bacterial and archaeal motility systems using bacterial genetics molecular biology biochemistry biophysics structural biology cell biology microscopy imaging and molecular dynamics simulation Beginning with a section on bacterial flagellar protein export and assembly the book continues with chapters covering flagella driven motility of bacteria archaea driven motility of archaea type IV driven twitching motility of bacteria as well as adhesion based gliding motility of bacteria and other unique motility systems Written for the highly successful *Methods in Molecular Biology* series chapters include introductions to their respective topics lists of the necessary materials and reagents step by step and readily reproducible laboratory protocols and tips on troubleshooting and avoiding known pitfalls Authoritative and thorough *Bacterial and Archaeal Motility* is the ideal reference for researchers working in this vital area of microbiology *Production of Recombinant Proteins* Gerd Gellissen,2006-03-06 While the



choices of microbial and eukaryotic expression systems for production of recombinant proteins are many most researchers in academic and industrial settings do not have ready access to pertinent biological and technical information since it is normally scattered throughout the scientific literature This book closes the gap by providing information on the general biology of the host organism a description of the expression platform a methodological section with strains genetic elements vectors and special methods where applicable as well as examples of proteins produced with the respective platform The systems thus described are well balanced by the inclusion of three prokaryotes two Gram negatives and one Gram positive four yeasts two filamentous fungi and two higher eukaryotic cell systems mammalian and plant cells Throughout the book provides valuable practical and theoretical information on the criteria and schemes for selecting the appropriate expression platform the possibility and practicality of a universal expression vector and on comparative industrial scale fermentation with the production of a recombinant Hepatitis B vaccine chosen as an industrial example With a foreword by Herbert P Schweizer Colorado State University USA As a whole this book is a valuable and overdue resource for a varied audience It is a practical guide for academic and industrial researchers who are confronted with the design of the most suitable expression platform for their favorite protein for technical or pharmaceutical purposes In addition the book is also a valuable study resource for professors and students in the fields of applied biology and biotechnology

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