Diseases caused by *Streptococcus pyogenes*, also known as the group A streptococcus, have been described since the early times of written history. While we have come to know a great deal about this human specific pathogen and its associated diseases, there is still much to learn. The aim of this volume is to present a current summary of every aspect of this microorganism: in other words, the A to Z of contemporary information about *Streptococcus pyogenes*.

The various topics covered in the following chapters are presented in a progression that ranges from basic biology to clinical manifestations. Early research on *Streptococcus pyogenes* during the last century was aimed at developing a vaccine to prevent its many associated diseases, and in the process, provided much of the basic biology, physiology, and immunology that has been essential for ongoing research. With the advent of genetic and molecular biology approaches, as well as the new tools of genetic engineering, DNA and protein sequencing, a new era of -omics appeared, including genomics, proteomics, and metabolomics. Information from these studies has been applied to the development of vaccines, understanding genetic regulation, and epidemiology.

Infections with *Streptococcus pyogenes* result in a wider variety of diseases than perhaps any other microorganism, ranging from throat and skin infections, scarlet fever, puerperal fever, and necrotizing fasciitis, to the post-infection sequelae of rheumatic fever and acute glomerulonephritis. More recent disease descriptions in the 1980s and 1990s include diseases such as streptococcal toxic shock syndrome and pediatric autoimmune neuropsychiatric disorders associated with streptococcal infections (or PANDAS). Epidemiological studies have been important in defining these recent diseases, as well as providing a greater understanding of their transmission, control, and prevention. Moreover, a variety of model systems provide new information about mechanisms of pathogenesis, as well as insights into intracellular invasion and the carrier state. Finally, the development of a vaccine, as well as new and innovative methods of anti-infective control will be important areas of continued research.

This book represents a concerted effort by an international group of *S. pyogenes* researchers, each an expert in their own area of work, who have generously provided their time and energy to present the current status of work in their own field. In virtually all areas, their work was supported with financial assistance from various national and international research institutions, organizations, and foundations. In recognition of this support, these researchers pay forward their scientific knowledge to the general public, as well as to the next generation of students, scholars, and researchers. As a living document in an open access format, additions of new information and updates on each topic can be provided on a regular basis. Our hope is that this volume will serve not only as an important resource and standard reference for public information, but also an aid to stimulate further research that will lead to better methods of disease control and treatment.
Editors

Joseph J. Ferretti, Ph.D., is an emeritus professor in the Department of Microbiology and Immunology at the University of Oklahoma Health Sciences Center in Oklahoma City, Oklahoma. He has worked in the area of *Streptococcus pyogenes* research for over 50 years since his early days at the University of Minnesota, where he trained under the tutelage of Lewis Wannamaker, Elia Ayoub, and Ernest Gray. Following a postdoctoral fellowship at The Johns Hopkins University, where he worked with Philip E. Hartman in the study of microbial genetics, he joined the University of Oklahoma Health Sciences Center in 1969. His main research contributions, supported by years of support from NIH and other agencies, have been in the areas of streptococcal genetics, regulation of virulence factors, bacteriophages, and genomics. Dr. Ferretti is the author or co-editor of four books, including Basic Microbiology and Genetics; *Streptococcal Genetics; Genetics of Streptococci, Enterococci, and Lactococci*; and the ASM book on Gram-Positive Pathogens.

Dennis L. Stevens, Ph.D., M.D., is Chief of the Infectious Diseases Section, Director of Research and Development of the Veterans Affairs Medical Center in Boise, Idaho and Professor of Medicine at the University of Washington's School of Medicine in Seattle, Washington. Dr. Stevens obtained a Ph.D. in Microbiology from Montana State University and an MD from the University of Utah. Dr. Stevens’ major research interests have been the pathogenesis of serious infections caused by toxin-producing Gram positive pathogens, including *Clostridium perfringens*, *Clostridium sordellii*, group A streptococcus, and methicillin-resistant *Staphylococcus aureus* (MRSA). He is a member of the CDC Working Group on Invasive Streptococcal Infections, a consultant to the WHO, and an invited participant to the NIH Workforce on severe group A streptococcal infections. Dr. Stevens is editor or co-editor of four books on skin and soft tissue infection, including co-editor with Dr. Edward Kaplan of the book *Streptococcal Infections: Clinical Aspects, Microbiology, and Molecular Pathogenesis*.

Vincent A. Fischetti, Ph.D., is Professor and Chairman of the Laboratory of Bacterial Pathogenesis and Immunology at the Rockefeller University in New York, and received his Ph.D. in Microbiology from New York University. He has over 50 years of experience in the field of anti-infectives, focusing on understanding the earliest events in Gram-positive bacterial infections. Over the years, one of his interests has been to examine the surface molecules on Gram-positive bacteria—particularly the surface M protein on *S. pyogenes* and its coiled-coil structure. His work with bacteriophages has led to the development of phage lysins as novel therapeutics. Dr. Fischetti is a fellow of the American Academy of Microbiology, and is the recipient of two NIH MERIT awards. He has been editor-in-chief of the ASM journal Infection and Immunity for 10 years, and is a co-editor of the ASM book Gram-Positive Pathogens.

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