Preface

Since the first edition of this book was published in 2007 significant progress has been made on *Salmonella* and *Salmonella*–host cell interactions spanning a variety of aspects on cellular, molecular, and genetic characterizations. Research on *Salmonella* has generated enormous new interest with the realization that many bacteria have developed resistance to the most common antibiotics and new strategies are in demand to overcome antibiotic resistance of harmful enterobacteria such as *Salmonella*. Typhoid fever caused by *Salmonella* can normally be treated with broad-spectrum antibiotics including tetracycline, chlortetracycline, oxytetracycline, demeclocycline, methacycline, doxycycline, minocycline, and a number of other semisynthetic derivatives but *Salmonella* resistance to antibiotics has increasingly become a problem and new avenues are being explored to discover new antibiotics that interfere with bacterial components while not harming their mammalian host cells. Vaccine development has progressed significantly and includes nanotechnology-based approaches with promising results for effective protection.

Salmonella ranks second in causing food-borne illnesses, and every year millions of people worldwide become ill and many thousands die as a result of infections caused by food-borne pathogens in developed as well as underdeveloped countries. A whole host of basic discoveries have resulted in new approaches to prevent and treat *Salmonella* infections acquired through food contaminations, several of which are featured in the present book.

Aside from research to overcome *Salmonella* infections, genetic manipulations of *Salmonella* have led to a new line of research using genetically modified attenuated *Salmonella* as oral vectors for targeted gene delivery and as tumor-targeting vectors that have been developed for applications in novel cancer therapies.

As in the previous edition, the second edition of this book on *Salmonella* presents detailed methods on a variety of different aspects and has selected those that have provided landmarks in advancing our knowledge on *Salmonella* research. The new edition features new methods including chapters on molecular assays for detection, identification, and serotyping of *Salmonella*, quantitative proteomic identification of host factors involved in *Salmonella* infection, determination of antimicrobial resistance in *Salmonella*, site-directed mutagenesis, chromosomal gene analysis, development of bacterial nanoparticle vaccine, attachment of nanoparticle cargo to biotinylated *Salmonella* for combination bacteriotherapy against tumors, various microscopy methods to analyze *Salmonella* interaction with host cells, in vitro modeling of gallbladder-associated *Salmonella* colonization, analysis of *Salmonella* phages and prophages, and other methods as detailed in the specific chapters of this second edition.

As in the previous edition each chapter provides a short overview of the topic followed by detailed methods and protocols that are normally not described in regular research papers. Genetic manipulation, molecular methods, and molecular imaging are techniques that will be of interest to geneticists, cell and molecular biologists, microbiologists, environmentalists, toxicologists, public health scientists, clinicians in human and veterinary medicine, agriculture, and other researchers who want to become familiar and apply

techniques that are commonly not available in research papers. The methods presented here are in high demand and are expected to continue to be of value to researchers and to incoming investigators in the future. This book will also be of interest to students for the study of various aspects of research on *Salmonella*. Because no recent comprehensive literature of this format is available on *Salmonella*, this book will be of value to a wide variety of researchers. The methods presented are in high demand and are expected to continue to be of value to an increasing number of investigators in the *Salmonella* field.

We are delighted to present the second edition of *Salmonella* protocols depicting specific methods that have impacted *Salmonella* research and we are indebted to Dr. John Walker for inviting this second edition on *Salmonella*, and to the publisher with special thanks to David C. Casey. We are most grateful to our outstanding contributors for sharing their unique and specific expertise and experiences with the scientific community and for revealing details of practical insights that are not generally disseminated in regular research papers. Our sincere thanks to all for their most valuable contributions.

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