## PCR METHODS IN FOODS

#### FOOD MICROBIOLOGY AND FOOD SAFETY SERIES

Food Microbiology and Food Safety publishes valuable, practical, and timely resources for professionals and researchers working on microbiological topics associated with foods, as well as food safety issues and problems.

#### **Editor-in-Chief**

Michael P. Doyle Regents Professor and Director of the Center for Food Safety University of Georgia Griffin, Georgia

#### **Editorial Board**

#### Francis F. Busta

Director National Center for Food Production and Defense University of Minnesota Minneapolis, MN

#### Bruce R. Cords

Vice President Environment, Food Safety & Public Health Ecolab Inc. St. Paul, MN

#### **Catherine W. Donnelly**

Professor of Nutrition and Food science University of Vermont Burlington, VT

#### Paul A. Hall

Senior Director Microbiology & Food Safety Kraft Foods North America Glenview, IL

#### Ailsa D. Hocking

Chief Research Scientist CSIRO Food Science Australia North Ryde, Australia

#### Thomas J. Montville

Professor of Food Microbiology Rutgers University New Brunswick, NJ

#### **R. Bruce Tompkin**

Formerly Vice President-Product Safety ConAgra Refrigerated Prepared Foods Downers Grove, IL

# **PCR METHODS IN FOODS**

Edited by John Maurer

The University of Georgia, Athens Athens, GA, USA



Dr. John Maurer 252 Poultry Diagnostic and Research Center College of Veterinary Medicine The University of Georgia Athens, GA 30602 USA

ISBN-10: 0-387-28264-5 ISBN-13: 978-0387-28264-0

Printed on acid-free paper.

© 2006 Springer Science+Business Media, Inc.

All rights reserved. This work may not be translated or copied in whole or in part without the written permission of the publisher (Springer Science+Business Media, Inc., 233 Spring Street, New York, NY 10013, USA), except for brief excerpts in connection with reviews or scholarly analysis. Use in connection with any form of information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now know or hereafter developed is forbidden.

The use in this publication of trade names, trademarks, service marks and similar terms, even if they are not identified as such, is not to be taken as an expression of opinion as to whether or not they are subject to proprietary rights.

(SPI/SBA)

Printed in the United States of America.

9 8 7 6 5 4 3 2 1

springeronline.com

### Preface

This book will introduce non-molecular biologists to diagnostic PCR-based technologies for the detection of pathogens in foods. By the conclusion of this book, the reader should be able to: 1) understand the principles behind PCR including real-time; 2) know the basics involved in the design, optimization, and implementation of PCR in food microbiology lab setting; 3) interpret results; 4) know limitations and strengths of PCR; and 5) understand the basic principles behind a new fledgling technology, microarrays and its potential applications in food microbiology. This book will provide readers with the latest information on PCR and microarray based tests and their application towards the detection of bacterial, protozoal and viral pathogens in foods. Figures, charts, and tables will be used, where appropriate, to help illustrate concepts or provide the reader with useful information or resources as an important starting point in bringing molecular diagnostics into the food microbiology lab. This book is not designed to be a "cookbook" PCR manual with recipes and step-by-step instructions but rather serve as a primer or resource book for students, faculty, and other professionals interested in molecular biology and its integration into food safety.

## **Table of Contents**

Preface
Chapter 1. PCR Basics
Amanda Fairchild, M.S., Margie D. Lee DVM, Ph.D., and John J. Maurer, Ph.D.
Chapter 2. The Mythology of PCR: A Warning to the Wise
John J. Maurer, Ph.D
Chapter 3. Sample Preparation for PCR
Margie D. Lee, DVM, Ph.D. and Amanda Fairchild, M.S 4
Chapter 4. Making PCR a Normal Routine of the Food Microbiology Lab
Susan Sanchez, Ph.D 5
Chapter 5. Molecular Detection of Foodborne Bacterial Pathogens
Azlin Mustapha, Ph.D. and Yong Li, Ph.D
Chapter 6. Molecular Approaches for the Detection of Foodborne Viral Pathogens
Doris H. D'Souza and Lee-Ann Jaykus9
Chapter 7. Molecular Tools for the Identification of Foodborne Parasites
Ynes Ortega, Ph.D 11
Index 14