

Food Microbiology

FUNDAMENTALS AND FRONTIERS

2nd Edition



EDITED BY

Michael P. Doyle
Larry R. Beuchat
Thomas J. Montville

Contents

<i>Contributors</i>	ix
<i>Reviewers</i>	xiv
<i>Preface</i>	xv

I. Factors of Special Significance to Food Microbiology 1

1. The Evolution of Food Microbiology 3
PAUL A. HARTMAN
 2. Principles Which Influence Microbial Growth, Survival, and Death in Foods 13
THOMAS J. MONTVILLE AND KARL R. MATTHEWS
 3. Spores and Their Significance 33
PETER SETLOW AND ERIC A. JOHNSON
 4. Indicator Microorganisms and Microbiological Criteria 71
MERLE D. PIERSON AND L. MICHELE SMOOTH
- ## ***II. Microbial Spoilage of Foods*** 89
5. Meat, Poultry, and Seafood 91
TIMOTHY C. JACKSON, DOUGLAS L. MARSHALL, GARY R. ACUFF, AND JAMES S. DICKSON
 6. Milk and Dairy Products 111
JOSEPH F. FRANK
 7. Fruits, Vegetables, and Grains 127
ROBERT E. BRACKETT

III. Foodborne Pathogenic Bacteria 139

8. *Salmonella* Species 141
J. STAN BAILEY AND JOHN J. MAURER
9. *Campylobacter jejuni* 179
IRVING NACHAMKIN
10. Enterohemorrhagic *Escherichia coli* 193
JIANGHONG MENG, MICHAEL P. DOYLE, TONG ZHAO,
AND SHAOHUA ZHAO
11. *Yersinia enterocolitica* 215
ROY M. ROBINS-BROWNE
12. *Shigella* Species 247
KEITH A. LAMPEL AND ANTHONY T. MAURELLI
13. *Vibrio* Species 263
JAMES D. OLIVER AND JAMES B. KAPER
14. *Aeromonas* and *Plesiomonas* Species 301
SYLVIA M. KIROV
15. *Clostridium botulinum* 329
JOHN W. AUSTIN
16. *Clostridium perfringens* 351
BRUCE A. MCCLANE
17. *Bacillus cereus* 373
PER EINAR GRANUM
18. *Listeria monocytogenes* 383
BALA SWAMINATHAN
19. *Staphylococcus aureus* 411
LYNN M. JABLONSKI AND GREGORY A. BOHACH
20. Epidemiology of Foodborne Illnesses 435
CRAIG W. HEDBERG

IV. Mycotoxigenic Molds 449

21. Toxigenic *Aspergillus* Species 451
AILSA D. HOCKING
22. Toxigenic *Penicillium* Species 467
JOHN I. PITTS
23. Fusaria and Toxigenic Molds Other than Aspergilli
and Penicillia 481
LLOYD B. BULLERMAN

V. Viruses 499

24. Foodborne Viruses 501
DEAN O. CLIVER

VI. Foodborne and Waterborne Parasites 513

25. Helminths in Meat 515
CHARLES W. KIM AND H. RAY GAMBLE
26. Helminths Acquired from Finfish, Shellfish, and Other Food Sources 533
EUGENE G. HAYUNGA
27. Protozoan Parasites 549
YNES R. ORTEGA

VII. Preservatives and Preservation Methods 565

28. Physical Methods of Food Preservation 567
JÓZSEF FARKAS
29. Chemical Preservatives and Natural Antimicrobial Compounds 593
P. MICHAEL DAVIDSON
30. Biologically Based Preservation Systems 629
THOMAS J. MONTVILLE, KAREN WINKOWSKI AND MICHAEL L. CHIKINDAS

VIII. Food Fermentations 649

31. Fermented Dairy Products 651
MARK E. JOHNSON AND JAMES L. STEELE
32. Fermented Vegetables 665
HERBERT J. BUCKENHÜSKES
33. Fermented Meat, Poultry, and Fish Products 681
STEVEN C. RICKE, IRENE ZABALA DÍAZ, AND JIMMY T. KEETON
34. Traditional Fermented Foods 701
LARRY R. BEUCHAT
35. Cocoa and Coffee 721
STERLING S. THOMPSON, KENNETH B. MILLER, AND ALEX S. LOPEZ
36. Beer 735
IAIN CAMPBELL
37. Wine 747
GRAHAM H. FLEET

IX. Advanced Techniques in Food Microbiology 773

38. Development and Impact of Rapid Methods for Detection
of Foodborne Pathogens 775

PETER FENG

39. Probiotics and Prebiotics 797

TODD R. KLAENHAMMER

40. Predictive Modeling and Risk Assessment 813

RICHARD C. WHITING AND ROBERT L. BUCHANAN

41. Hazard Analysis and Critical Control Point System: Use
in Controlling Microbiological Hazards 833

DANE BERNARD