

Contents

Contributors / xi

Preface / xvii

I Hazard Identification

- 1 **Microbial Flora of Humans and Microbial Virulence Factors** / 3
PAUL A. GRANATO
- 2 **Indigenous and Pathogenic Agents of Research Animals** / 19
DIANE O. FLEMING
- 3 **Laboratory, Growth Chamber, and Greenhouse Microbial Safety: Plant Pathogens and Plant-Associated Microorganisms of Significance to Human Health** / 35
ANNE K. VIDAVER, SUE A. TOLIN,
AND PATRICIA LAMBRECHT
- 4 **Epidemiology of Laboratory-Associated Infections** / 53
A. LYNN HARDING AND KAREN BRANDT BYERS

II Hazard Assessment

- 5 **Risk Assessment of Biological Hazards** / 81
DIANE O. FLEMING
- 6 **Bacterial Pathogens** / 93
JOSEPH H. COGGIN, JR.

- 7 **Protozoa and Helminths / 115**
BARBARA L. HERWALDT
- 8 **Mycotic Agents of Human Disease / 163**
WILEY A. SCHELL
- 9 **Viral Agents of Human Disease:
Biosafety Concerns / 179**
JASON PARAGAS AND TIMOTHY P. ENDY
- 10 **Biosafety for Microorganisms Transmitted Primarily
by the Airborne Route / 209**
MICHAEL A. PENTELLA, PAMELA A. KOSTLE,
LUCY DESJARDIN, AND MARY J. R. GILCHRIST
- 11 **Cell Lines: Applications and Biosafety / 221**
OTTO DOBLHOFF-DIER AND GLYN STACEY
- 12 **Allergens of Animal and Biological Systems / 241**
WANDA PHIPATANAKUL AND ROBERT A. WOOD
- 13 **Biological Toxins: Safety and Science / 253**
JOSEPH P. KOZLOVAC AND ROBERT J. HAWLEY

III Hazard Control

- 14 **Design of Biomedical Laboratory Facilities / 273**
JONATHAN T. CRANE AND JONATHAN Y. RICHMOND
- 15 **Primary Barriers and Equipment-Associated
Hazards / 295**
ELIZABETH A. GILMAN DUANE AND RICHARD C. FINK
- 16 **Primary Barriers: Biological Safety Cabinets,
Fume Hoods, and Glove Boxes / 303**
DAVID G. STUART, DAVID C. EAGLESON,
AND CHARLES W. QUINT, JR.
- 17 **Personal Respiratory Protection / 325**
NICOLE VARS McCULLOUGH
- 18 **Standard (Universal) Precautions for Handling
Human Specimens / 341**
DEBRA L. HUNT
- 19 **Prudent Biosafety Practices / 361**
DIANE O. FLEMING
- 20 **Decontamination and Disinfection / 373**
MARTIN S. FAVERO AND MATTHEW J. ARDUINO
- 21 **Packing and Shipping Biological Materials / 383**
LARRY D. GRAY AND JAMES W. SNYDER

IV Administrative Controls

- 22 Biological Safety Program Management / 405**
LOUANN CRAWFORD BURNETT
- 23 Biosafety Compliance: a Global Perspective / 417**
RICHARD REBAR AND HALLEY MORIYAMA
- 24 Occupational Medicine in a Biomedical
Research Setting / 437**
DEBORAH E. WILSON AND JAMES M. SCHMITT
- 25 Measuring Biosafety Program Effectiveness / 445**
JANET S. PETERSON AND ROBERT J. HASHIMOTO

V Special Considerations for Biosafety

- 26 Biosafety of Prion Diseases / 461**
HENRY BARON AND STANLEY B. PRUSINER
- 27 Safety Considerations in the BSL-4 Maximum-
Containment Laboratory / 487**
DAVID S. BRESSLER AND ROBERT J. HAWLEY
- 28 Biosafety and Viral Gene Transfer Vectors / 509**
THOMAS A. KOST, PATRICK J. CONDREAY,
AND CLAUDIA A. MICKELSON
- 29 Biosafety in the Teaching Laboratory / 531**
DAVID M. CARLBERG AND MICHAEL R. YEAMAN
- 30 Biosafety in the Pharmaceutical Industry / 551**
PAUL J. MEECHAN, JOSEPH GYURIS, BRIAN R. PETUCH,
MICHEL M. CHARTRAIN, AND WAYNE K. HERBER
- 31 Large-Scale Production of Microorganisms / 561**
MARY L. CIPRIANO
- 32 Special Considerations for Agriculture Pathogen
Biosafety / 579**
ROBERT A. HECKERT AND JOSEPH P. KOZLOVAC
- 33 Biosafety and Biosecurity: Regulatory Impact / 587**
ROBERT J. HAWLEY AND THERESA D. DULEY

Index / 597