Preface

A decade has passed since publication of the last edition of this book, and the ten intervening years have been most eventful, regarding microbes. As a result, this fifth edition is not only completely updated and revised, but more than a third of the chapters cover subjects never treated in previous editions.

In the interim since the last edition, our profession discovered to its alarm that some pathogenic bacteria have become resistant to all antibiotics used to control them. As this process of microbial resistance continues, it will be necessary to find new, effective antibiotics and synthetic chemicals to take their place. More emphasis will be needed on preventing infection by sterilization, disinfection, preservation, antisepsis, and asepsis by the use of the antimicrobial agents described in this book. Fortunately, experiments have shown that most microorganisms have not become resistant to disinfectants as they have to antibiotics, and where some have become resistant to small concentrations of the chemical, they are just as susceptible to normal-use concentrations as nonresistant members of the same species.

The past decade has witnessed many threatening microbial assaults including: the spread of HIV around the world; 6 to 8 million new cases of tuberculosis every year plus a dangerous, antibiotic-resistant strain; hundreds of thousands sickened in one outbreak of cryptosporidium in the drinking water; shocking deaths caused by hamburgers infected with a toxic variant on the normally harmless *E. coli*; the scary Hanta virus appearing in the Southwestern United States and the terrifying Ebola virus in Africa; human deaths associated with the "Mad Cow" disease caused by prions, a tough, strange, death-dealing type of pathogen; then new, emerging diseases coming unexpectedly from other lands due to intercontinental transportation of people and animals; and the terrible threat of biological warfare by terrorists and rogue nations. All these subjects and others are discussed in chapters of this fifth edition.

Medicine and surgery have made great advances, but these advances may cause problems. Thanks to sophisticated endoscopes that penetrate deep into the body, the physician can make efficient diagnoses and the surgeon can operate without having to cut the patient wide open. But these instruments can carry microorganisms from one patient to another and must be disinfected between patients. The lumens of the endoscopes are narrow, easily contaminated, and difficult to clean and disinfect. In this decade we have seen many more patients receiving implants of pacemakers, mechanical joints, and other devices, as well as transfers of whole living organs. It is obvious that these operations must be as germ-free as possible.

To complicate the problem, in organ transplants the body's normal immune response must be suppressed, making the patient susceptible to infection from aggressive, opportunistic microbes that are not normally pathogenic. This condition of suppressed immunity is found in AIDS patients and patients receiving cancer therapy. These matters are also considered in this edition.

Happily, we have new tools to cope with these problems as well as improved traditional tools. The last edition of this book discussed a sterilization process just being developed: the use of cold, gaseous plasmas for killing microorganisms. Today, there are several thousand installations of this process around the world. A process described in this edition is now at the same stage of development as the plasma process was in the last edition. This new process uses intense pulsating beams of light for sterilizing vaccines and other fluid pharmaceuticals during the manufacturing process. Currently, there is greater utilization of electron-beam and x-ray sterilization in addition to ultraviolet disinfection. Undergoing evaluation are methods of microbial destruction employing high-pressure, high-intensity electric field pulses and oscillating magnetic field pulses. The reader will also find new methods for disinfecting and disposal of medical wastes.

Among the new chapters are those dealing with synergism between chemical agents, the use of antibiotics as antiseptics, the problem of biofouling by microbial biofilms, and new regulations of antimicrobials by the U.S. Environmental Protection Agency and the U.S. Food and Drug Administration.

In the first edition of this book there was a chapter on spacecraft sterilization. Space landers were sterilized because it was feared that spacecrafts landing on the moon and Mars might infect those bodies with our microorganisms. But when it was determined there was no life there, the process was discontinued. Now, since water is suspected on the heavenly bodies, there is renewed consideration of spacecraft sterilization. That chapter is only one of many valuable chapters in former editions that cannot be included here for lack of space. For that reason we have given the readers a listing of those chapters not repeated in this edition.

Seymour S. Block, Ph.D.

Chapters Appearing in Earlier Editions

Title	Authors	Edition[a]	Pages	Year
Oligodynamic Metals	I.B. Romans	1st	372-400	1968
Bisphenols	W.S. Gump	2nd	252-281	1977
Salicylanilides and Carbanilides	H.C. Stecker	2nd	282-300	1977
Spacecraft Sterilization	L.B. Hall, M.S. Favero, and R.G. Lyle	2nd	611-640	1977
Mercurials - Inorganic and Organic	N. Grier	3rd	346-374	1983
Silver and its Compounds	N. Grier	3rd	375-389	1983
Heavy Metals other than Mercury and Silver	A.J. Salle	3rd	390-400	1983
Pseudomonas	H.E. Morton	3rd	401-413	1983
Acid-Anionic Compounds	G.R. Dychdala and A. Lopez	4th	256-262	1991
Amphoteric Compounds	S.S. Block	4th	262-273	1991
Polymeric Antimicrobial Agents	O.W. May	4th	322-333	1991
Organotin Compounds	M.H. Gitlitz and C.B. Beiter	4th	344-357	1991
Copper and Zinc Preservatives	C.C. Yeager	4th	358-364	1991
Germ-Free Technology	Nobuhiko Ohnishi and Shogo Sasaki	4th	696-712	1991
Antimicrobial Agents Used in Agriculture	R.J. Lukens	4th	759-772	1991
Sanitation in Food Manufacturing Operations	H.W. Walker and W.S. LaGrange	4th	791-801	1991
Chemical Food Preservatives	P.M. Foegeding and F.F. Busta	4th	802-832	1991
Aseptic Food Packaging	B. von Bockelmann	4th	833-945	1991
Preservation of Cosmetics	F. Sharpell and M. Manowitz	4th	887-900	1991
Preservation for Industrial and Miscellaneous Products	S.S. Block	4th	901-947	1991
Preservation of Metals from Biocorrosion	J.R. Sifontes and S.S. Block	4th	948-976	1991
Marketing Overview of Specialty Biocides	A.J. Marisca	4th	999-1008	1991

[a]Latest appearance.