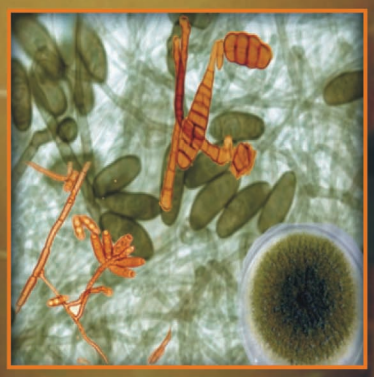
MICROBES IN PRACTICE

PRAKASH S. BISEN



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Dedicated to
my Beloved Parents

Preface

Microbes in Practice impinges on almost every aspect of human existence. An attempt to cover the whole of the subject would have been an impossible task. I have confined myself to a consideration of the aspects of microbiology in which I have research experience: bacteriology, mycology, immunology and virology. I have also tried to concentrate on the fundamental problems in the subject. What constitute the microbes? How do they differ from higher organisms and from each other? How can microbes be controlled, visualized, enumerated and cultured? How are they classified? The answer to these and other could be found in this book with illustrations. With this book, I hope to provide a firm framework of microbiological concepts for students whose requirements are more modest. There are several excellent textbooks available to students of Microbiology. However, there is a lack of concise presentation that gives an overview of the field to the students of microbiology and also presents the required basic knowledge of general microbiology to students of zoology, botany, chemistry, agriculture, nutrition, pharmacy, biotechnology, etc. This book is designed to appeal to such a wide spectrum of readers. Its aim is to convey a general view as well as specific knowledge and to stimulate.

Microbiology deals mostly with the large group of fungi, bacteria and viruses which equal in diversity and physiological phenomena the more traditional group of organisms within the disciplines of botany and zoology. During recent years the study of microorganisms has contributed important insights into the basic problems of biology. Because of their ease of manipulation, rapid growth, highly developed capacity for adaptation, and other properties, microorganisms are one of the preferred objects of research in biochemistry and genetics. They are employed successfully for varied purpose as studying the pathogenic nature of an organism, growing auxotrophs, gene transfer, gene expression, experiments in molecular biology, protoplast fusion, gene therapy, modification of industrial strains, food, dairy, beverages industries, pharmaceutical industries, freeing plants of pathogens and other innumerable works for the welfare of the mankind. The topics and the techniques described in the book reflect this diversity.

I believe that many biologists would like to use microbiological techniques in their research, but hesitate to do so because of lack of information. In spite of several excellent books on the physiology, biochemistry and molecular biology of microorganisms there exists no single book which can explain the metabolism of tiny creatures with a practical approach and which includes a brief text on the microbiological experiments useful for the workers in the allied fields at various levels. A constant need for such a text material was widely felt which describes the methods in simple language supplemented with sufficient illustrations and various media composition. The chapters have been made

complete by giving the expected results and flow charts to make experiment easier and enjoyable. The subject matter and their results are illustrated in line diagrams in lucid manner.

Beginning with the characteristic difference between prokaryotes and eukaryotes and classification of microorganisms the book depicts the various methods employed to characterize and cultivate different forms of microbes, different media used and various procedures involved with the isolation and characterization of microorganisms. Several staining procedures, chemical compositions of media, biochemical tests, medical microbiology and immunology, microbes in relation to plants, waste management, industrial application, aquatic environment and soil has been compiled at one place in different chapters. Separate chapters have been formulated for dairy and food microbiology and medical microbiology and immunology with application of membrane filter technique, standard plate count at several places. Mushroom cultivation technology has been described in depth.

Every care has been taken to include the minute details. Author claims no originality for the methods described in the book, except for the fact that each method has been carried out in the laboratories before being included. It is therefore; presumed that there would be no difficulty for any moderately equipped laboratory in the use of these methods. The exercises have been formulated by keeping in mind the hazards of chemicals and only those exercises are given which minimize the exposure of students to potentially pathogenic organisms and hazardous chemicals.

This book is written during a period of rapid expansion in higher and technical education and when several institutions (Public funded and Private players) was embracing modularization and transforming their basic courses into vocational education competing with other professional courses. Writing this text provided an enjoyable relief. To all these and other I owe a debt of gratitude to my friends and students. Their advice has been invaluable, but any mistake in the text is now all mine.

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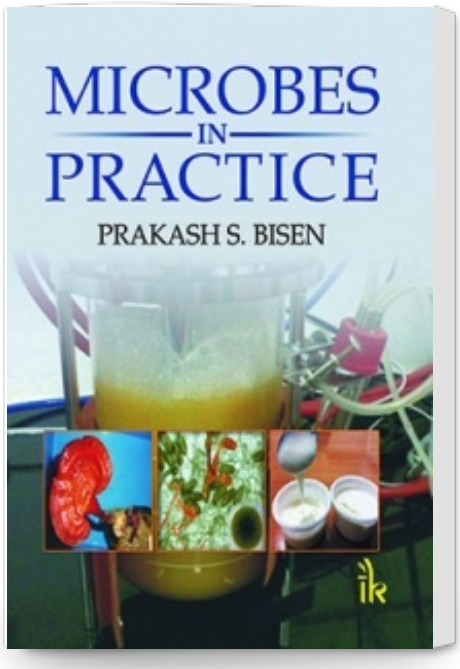

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