

ADVANCES IN MICROBIOLOGY

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***Dedicated to
My Teacher
Dr. SUDHAKAR MISHRA***

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PREFACE

Microbiology has become increasingly useful to our society now, and it has emerged as one of the most important branch of the Life sciences. Microbiologist have made significant contributions to basic biological science as well as in the applied areas of public health, medical sciences, agriculture, industry and environmental sciences. The most dramatic current development in applied microbiology is due to development of genetic engineering and recombinant DNA technology. Using these techniques, microorganism can be engineered through modification of its DNA to produce new substances such as human proteins. Bacteria have been modified to produce human insulin and interferon. Genetically engineered microorganisms hold great potentials for the production of drugs and vaccines, for improvement of agricultural crops and for other products and processes. There is growing recognition of the potential of microorganisms in many applied areas. The ability of micro-organisms to decompose materials such as — herbicides, pesticides and oils in oil spills, the potential of microorganism as food supplement, the exploitation of microbial activity to produce methane gas as energy sources for rural consumption and the potential of new therapeutic substances produced by microorganisms — these are and the other uses of microorganisms are also becoming attractive. Bio-remediation processes use microorganisms to clean-up toxic wastes. Microorganisms are being used as biological control agent for pests. In gene therapy, viruses are used to carry replacements for defective or missing genes into human cells. Genetically engineered bacteria are used in agriculture to protect plants from frost and insects and to improve the shelf-life of produce.

This book “Advances in Microbiology” provides a comprehensive and critical review of the work done on different areas of microbiology including agriculture, industry, medical science, bioremediation etc. The book contains 24 chapters, which include informations on the status of microbial diversity, applications of biosensors, *Azolla* as biofertilizer, *Frankia* - nitrogen fixing actinomycetes, extraction of metals from ores using bacteria, alkaliphiles, citric acid fermentation, biodiversity of cyanobacteria, microbial degradation of xenobiotics etc. Aspects, covering biotechnological applications of microbes for improved plant productivity and new approaches for development of vaccines have been

specially included to project out their role and use in the twenty-first century. Comprehensive account of microbes in the management of soil borne diseases and plant parasitic nematodes throw light on the importance of microbes in the management of plant pests.

This festschrift — *Advances in Microbiology* is a humble dedication to Dr. S. Mishra and to commemorate his outstanding contribution in the field of General Botany and Phytoplasma in particular. Dr. Mishra is a dedicated teacher and an accomplished researcher, which is testified by students who got their doctoral degree under his able supervision. He has published many research papers, completed research projects and participated in many national and international conferences. Dr. Mishra has been the sole worker in the field of Mycoplasma at the University of Rajasthan. He is a voracious reader and has a rich personal library. Dr. Mishra is not an armchair academician and is actively associated with science education centre and has extensive field knowledge. He taught me microbiology and molecular biology during my M.Sc., I wish and pray for a long, sustained creative life for him for many many more years to come.

The publication of this book could not have been possible without the sincere cooperation and hard work of the contributors. They are all specialists in their respective fields. Therefore, I have tried to honour their ideas in the original shape. While dealing with such a voluminous work, errors are likely to occur despite my best efforts. However, the onus of technical contents rests with the contributors.

I am highly thankful to all the learned contributors for their cooperation in compiling useful information on various facets of microbiology. I am sure, this detailed account on a wide variety of subjects will be of great help to researchers and teachers of microbiology and for planning future strategies for the development world over.

I wish to thank my wife Kusum, daughter Priyanka and son Rohit, who extended their cooperation in many invisible ways to me. I highly appreciate the all-round cooperation and support of Mr. Pawan Kumar, Scientific Publishers (India), Jodhpur for printing and publishing this book with patience, care and interest.

JAIPUR

P.C. Trivedi

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