
Preface

Though tiny in size, bacteria impart many useful applications for the sustainable maintenance of the ecosystem on earth. On the evolutionary lineage, they are the first to appear and had plenty of time to adapt in the environmental conditions, subsequently giving rise to numerous descendant forms. They are omnipresent in huge number and their diversity is extended from hydrothermal vents to the cold seeps. These tiny, one celled creatures carryout many useful functions and with the advancement of science, they have been explored greatly for use in food industry, agricultural industry, clinical sectors and many others. Biotechnological industries utilise bacterial cells for the production of biological substances that are useful for human existence including foods, medicines, hormones, enzymes, proteins and nucleic acids. Despite huge benefits human beings gain out of these microscopic organisms, a less attention has been paid to study these tiny creatures. Though the research on bacterial entities has gained momentum, it is estimated that only about 1 % of the microorganisms have been discovered so far. However, rapid advances in molecular biology have revolutionised the study of bacteria in the environment. It has provided new insights regarding their composition, phylogeny and physiology. New developments in biotechnology and environmental microbiology signify that microbiology will continue to be an exciting and emerging field of study in the future.

The study of bacteria dates back to 1900 AD and substantial advancement on the methodology and practices used for their study has been occurred. There are many textbooks, research and review articles dealing with state-of-art of various aspects of molecular biology of microorganisms. However, the users usually get lost in initiating an experiment due to lack of suitable easy protocols. In this regard, an assorted laboratory manual not only to motivate the researchers and students but also to enhance the acquisition of scientific knowledge as well as the scientific aptitude is the need of the hour. This laboratory manual 'Microbial biotechnology—a laboratory manual for bacterial systems' is an attempt to overcome the inherent cumbersome practices that is followed in most of the laboratories. Every effort has been made to present the protocols in a very simpler form for easy understanding of the undergraduates, graduates, postgraduates, doctoral students, active scientists and researchers. Additionally, most of the universities providing undergraduate and postgraduate courses in microbiology and biotechnology, can use for their laboratory experiments.

There is a considerable difference between a researcher and a technician. The technician can add the appropriate reagents to obtain the suitable result. However, the researcher should focus on 'how' and 'why'. Blindly following a protocol without knowing the principle and role of reagents will not be useful in a long run. Thus, an attempt has been made to make the novice students familiar with the principle of the each experimental setup and active role of each reagent to be used in each experiment. Thus, it will be helpful for the readers to modify the protocols as well as the reagents as per their requirement. The illustrative description of each experiment will be of great use in easy understanding of the readers, irrespective of their qualification and research expertise. Some specific experiments in the advanced field of environmental microbiology have been included in the last part of the manual which will increase the awareness among the students regarding the vast application of these tiny microorganisms for the sustainability of the ecosystem.

We have tried our best to incorporate all our experience and expertise to come out in the form of this manual. Throughout the writing process of this manual we have faced lots of problems and hurdles. All have been overcome due to God's grace, self-belief and people surrounding to us. We are highly thankful to each and every one for their support and encouragement in this process. We hope this manual will be of great use for the readers in their academic and research career. Wishing all the very best to the readers and their experiments!

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<http://www.springer.com/978-81-322-2094-7>

Microbial Biotechnology- A Laboratory Manual for
Bacterial Systems

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2015, XVI, 239 p. 143 illus., 86 illus. in color., Hardcover

ISBN: 978-81-322-2094-7