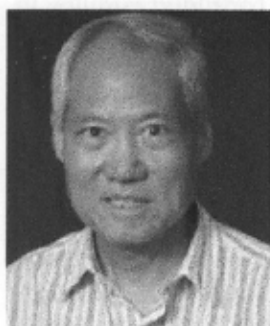


EDITOR-IN-CHIEF



Murray Moo-Young is a distinguished professor emeritus at the University of Waterloo, Canada. Before academia, he worked in England for the British Ministry of Industry. A Jamaican-Chinese Canadian, Dr. Moo-Young received his degrees from the University of London (BSc in chemistry; PhD in biochemical engineering) and University of Toronto (MSc in chemical engineering) followed by a postdoctoral fellowship at the University of Edinburgh. He has been a visiting professor at world-famous universities including MIT, UC Berkeley, Oxford University, EPFL Lausanne, University of Karlsruhe, Dalian University of Technology, and Osaka University. To date, his research has produced 13 books, nine patents, and over 355 papers. He is a consultant worldwide, and the executive editor of the journal *Biotechnology Advances* (Impact Factor 8.250). Dr. Moo-Young's honors include the

premiere awards of the Canadian Society for Chemical Engineering and the American Chemical Society, Biochemical Technology Division. As an elected fellow of the American Institute for Medical and Biological Engineering (FAIMBE) and the Royal Society of Canada (FRSC), "the highest accolade for a Canadian academic," Dr. Moo-Young is intentionally acclaimed as a leader in the field of biotechnology.

GENERAL PREFACE

The second edition of *Comprehensive Biotechnology* provides a comprehensive coverage of the broad multidisciplinary field of biotechnology with important updates of its *principles and practices in industry, medicine, agriculture, and the environment*. It organizes and expands on material that is dispersed among different specialized publications. It is a response to many enquiries from many quarters. From the publisher records, the first edition was accepted worldwide with much appreciation. For example, a review of the publication in the prestigious periodical *Nature* observed that it "will be an essential purchase for all departments and institutions, academic or industrial that claim an interest in...biotechnology". As before, this publication would be valuable to researchers, instructors, students, policy makers, and others in biotechnology-related activities.

In addition to traditional hard-copy print, this edition is also published as an online digitized document, which allows the use of modern electronic tools for seamless connections to the first edition and other relevant information with hyperlinks. For convenience, each article carries a glossary and a professional summary of the authors indicating their appropriate credentials. In a few instances, recent reprints are provided to acquire expertise in a timely manner. An extensive index for the entire publication gives a complete list of the many topics treated in the increasingly expanding field.

To facilitate 'one-stop shopping' for rapid service, the work is designed as an integrated compendium of six volumes covering all the essential elements of the field. The first two volumes provide the basics of the underlying scientific and engineering principles of biotechnology; the following four volumes treat the major

application branches that have an impact on industry, agriculture, medicine, and environment. Each volume has several sections to address various aspects of the given constituent areas. The volume editors provide a specific introduction to the nature and scope of the contents of a given volume. The volume titles, section titles, and respective editors of the six volumes are as follows.

Volume 1: Scientific fundamentals of biotechnology

- Section 1. The biochemical basis
- Section 2. The biological basis
- Section 3. The genetic basis
- Section 4. Systems biology
- Section 5. The metabolic basis
- Section 6. The biophysical basis
- Section 7. The computational basis
- Section 8. Analysis and control

Editor: Michael Butler, University of Manitoba, Canada

Volume 2: Engineering fundamentals of biotechnology

- Section 1. Underlying principles
- Section 2. Upstream processing
- Section 3. Bioreactors
 - 3A. Design
 - 3B. Application
- Section 4. Bioreactions and bioreactor operation
- Section 5. Downstream processing and product recovery
- Section 6. Process considerations
- Section 7. Other considerations

Editor: Colin Webb, University of Manchester, UK

Volume 3: Industrial biotechnology and commodity products

- Section 1. Bulk commodities
 - 1A. Industrial enzymes
 - 1B. Biofuels and bioenergy
 - 1C. Bio-based chemicals
 - 1D. Biomaterials
- Section 2. Healthcare products
 - 2A. Small molecules
 - 2B. Biologics
- Section 3. Food ingredients
- Section 4. Other considerations

Editors: Antonio Moreira, University of Maryland Baltimore County, USA; Ruth Cordoba-Rodriguez, Kathy Lee, US Food and Drug Administration; Fengwu Bai, Dalian University of Technology, China

Volume 4: Agricultural and related biotechnologies

- Section 1. Plant systems
- Section 2. Animal systems
- Section 3. Food systems
- Section 4. Integration of biotechnologies
- Section 5. Socioeconomic considerations

Editors: Bernard Grodzinski, W. Allan King, Rickey Yada, University of Guelph, Canada

Volume 5: Medical biotechnology and healthcare

- Section 1. Enabling technologies
- Section 2. Tissue engineering and stem cell therapy

Section 3. Biopharmaceuticals, *in vitro* drug testing, and drug delivery
Section 4. Artificial organs and life support devices
Editor: Zhanfeng Cui, University of Oxford, UK

Volume 6: Environmental biotechnology and safety

Section 1. Industrial and toxic wastes
Section 2. Municipal wastes
Section 3. Wastes from agriculture, forestry, and food processing
Section 4. Other considerations

Editors: Spiros Agathos, Catholic University of Louvain, Belgium; Fabio Fava,
University of Bologna, Italy

This work is unique as a comprehensive review of a multifaceted field in a single publication venue with all volumes published simultaneously rather than as a traditional book series. It is intended to meet the need of neophytes as well as veterans in the field and can potentially serve as teaching material for graduates and undergraduate students (especially seniors) in various subjects, including biological sciences, microbiology, biochemistry, chemical engineering, biochemical engineering, bioengineering, biomedical engineering, environmental sciences/engineering, food science/engineering, biotechnology, and bioprocessing. Other stakeholders in industry and government who cannot ignore the importance of biotechnology in commerce and society will also benefit from the contents of this work, making this a major reference for a diverse readership.

Many authors worldwide have contributed in accomplishing the multidimensional work with appropriate expertise. General guidance was provided by a prestigious international advisory board, which includes two Nobel laureates: W. Arber, Switzerland; B. Atkinson, UK; A. Chakrabarty, USA; R. Colwell, USA; A. Datta, India; D. A. Glaser, USA; J. Keasling, USA; G. Michaliszyn, Canada; M. Montagu, Belgium; M. L. Shuler, USA; S. Yang, China; T. Yoshida, Japan. The volume editors are internationally renowned biotechnologists and educators. The Editor-in-Chief is most fortunate to have had such remarkable support. The Elsevier *imprimatur* to complete this major endeavor is much appreciated: special thanks are due to Christine Minihane and Jason Mitchell.

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