
Preface

The development of biotechnology over the last 20 years, and particularly the use of recombinant DNA techniques, has rapidly expanded the opportunities for human benefits from living resources. Efforts to reduce pollution, prevent environmental damage, combat microbial infection, improve food production, and so on can each involve fermentation or the environmental release of microorganisms. Many products of fermentation technology, such as alcoholic beverages, bread, antibiotics, amino acids, vitamins, enzymes, and others, have been influenced by the progress of recombinant DNA techniques. The development of new products or the more efficient manufacturing of those already being produced often involve the use of microorganisms as cell factories for many productions and biotransformations.

Microbial Processes and Products is intended to provide practical experimental laboratory procedures for a wide range of processes and products mediated by microorganisms. Although not an exhaustive treatise, it provides a detailed “step-by-step” description of the most recent developments in such applied biotechnological processes. The detailed protocols we provide are cross-referenced in the Notes section, contain critical details, lists of problems and their troubleshooting, as well as safety recommendations that may not normally appear in journal articles and can be particularly useful for those unfamiliar with specific techniques.

The lead chapter of *Microbial Processes and Products* represents an overview on strain improvement programs and strategies to optimize fermentation processes. The remaining chapters detail comprehensive experimental methods for the optimal design of microbial metabolite production and for applying biotechnological processes to the manufacture of products used worldwide for human health, nutrition, and environmental protection, including semisynthetic derivatives of cephalosporins, erythromycin, antitumor compounds, plasmids for gene therapy and DNA vaccination, L-lysine, vitamins B₂ and B₁₂, the sweet-tasting protein thaumatin, the carotenoids β -carotene and astaxanthin, the polysaccharide gellan, and the bacteriocin-producing bacteria for sausage fermentation. Furthermore, the uses of the phenylacetyl-CoA catabolon for the enzymatic synthesis of penicillins, aromatic biotransformations, synthesis of new bioplastics, biosensor design, the synthesis of drug vehicles, and the development of a phosphatase encoding gene as a reporter and monitor gene expression are illustrated.

Additionally, *Microbial Processes and Products* offers techniques for analysis and quantification, including antimicrobial metabolites and carotenoids, volatile sulfur compounds, metabolic pathway fluxes, gene expression arrays, proteome analysis, methods to understand the mechanisms underlying bacterial modulation of the innate immune response, bioleaching activity, and microbial metal sulfide oxidation, and heavy metals remediation. Finally, three overview chapters on the transport of biological material, the deposit of biological material for patent purposes, and protection of biotechnological inventions are included.

Microbial Processes and Products has been written by outstanding experts in the field and provides a highly useful reference source for laboratory and industrial professionals, as well as for graduate students in a number of biological disciplines (biotechnology, microbiology, genetics, molecular biology) because of the uncommonly wide applicability of the procedures across the range of areas covered.

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José-Luis Barredo