

Methods in Enzymology

Volume 151

*Molecular Genetics
of Mammalian Cells*

EDITED BY

Michael M. Gottesman

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LABORATORY OF MOLECULAR BIOLOGY
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Menashe Marcus
(February 20, 1938–January 2, 1987)



This volume is dedicated to the memory of Menashe Marcus, a major contributor to the concept and substance of this book, who died on January 2, 1987 at the age of 48. Menashe was a scientific colleague, collaborator, and friend to many of the coauthors of this work. All who knew him were enriched by his kindness, generosity, wonderful sense of humor, and intellectual honesty. His professional life was spent at the Hebrew University in Jerusalem. He was dedicated to the advancement of biological research in Israel through his own work, his efforts to introduce precise scientific terminology into modern Hebrew, and through his many successful and devoted students. He maintained strong professional and personal ties with the scientific community in the United States, and did his post-doctoral work at the Massachusetts Institute of Technology, with sabbatical appointments at Columbia University College of Physicians and Surgeons, New York University School of Medicine, and the National Institutes of Health. His enthusiasm and vigorous support for the idea that

the seeds sown in phage and bacterial genetics would bear fruit in the study of mammalian cells in culture has been borne out by the exciting developments of recent years. Guided by this precept, he pioneered techniques for the isolation and analysis of cell cycle mutants of mammalian cells. His scientific colleagues and friends join his wife Nima and his daughter Nufar in mourning his premature death. He leaves a legacy of scientific achievement which will be long remembered.

MICHAEL M. GOTTESMAN

Preface

The use of the tools of molecular biology to isolate, identify, and map a mutant gene, thereby defining an important process in cellular metabolism, is no longer the sole province of the microbiologist. The recent amalgamation of classical somatic cell genetics with recombinant DNA and gene transfer technology has resulted in new approaches especially useful for the study of mutant cells. This volume illustrates how special techniques in molecular biology can be applied to the study of mutant somatic cells in culture. Basic protocols for the manipulation of recombinant DNA can be found in other *Methods in Enzymology* volumes: Recombinant DNA, Parts A-F, Volumes 68, 100, 101, 153, 154, and 155.

The book is divided into five sections representing the chronological and conceptual development of molecular cell genetics. The first section describes the origins and use of several important tissue culture systems developed for the genetic analysis of both undifferentiated and differentiated cells. For additional discussion of cultured cell systems, the reader is referred to Cell Culture, Volume 58 of this series. The second section presents methodology useful for the isolation of mutant mammalian cells. The third section details new procedures for the mapping of mammalian genes defined either by somatic cell mutations or cloned DNA fragments. The fourth section describes novel techniques for the isolation of mutant genes, and the final section presents new approaches to the study of gene expression in cultured mammalian cells.

I would like to thank William Jakoby for suggesting this project to me, Nathan Kaplan for his enthusiastic endorsement, Ira Pastan for continued support and encouragement, and my wife, Susan, and children, Daniel and Rebecca, for their forbearance. Special thanks are due to Robert Fleischmann for critical comments on some of the manuscripts, to Joyce Sharrar for excellent secretarial help, to my other colleagues in the Laboratory of Molecular Biology in the National Cancer Institute who provided a sounding board for ideas, and to the many contributors to this volume for their timely and clearly presented contributions.

MICHAEL M. GOTTESMAN

METHODS IN ENZYMOLOGY

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- V. Preparation and Assay of Enzymes
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