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Gene Cloning and Manipulation, Second Edition

Now fully updated to reflect recent advances, this introduction provides a broad, but concise, coverage of recombinant DNA techniques. Written for advanced undergraduates, graduates and scientists who want to use this technology, emphasis is placed on the concepts underlying particular types of cloning vector to aid understanding and to enable readers to devise suitable strategies for novel experimental situations. An introduction to the basic biochemical principles is presented first. Then PCR and cloning using *E. coli* hosts and plasmid, phage and hybrid vectors are described, followed by the generation and screening of libraries and how to modify, inactivate or express cloned sequences. Finally, genetic manipulation in a range of other organisms is discussed, including other bacteria, fungi, algae and plants, insects and mammals. A series of 'real-life' biological problems is also presented to enable readers to assess their understanding of the material and to prepare for exams.

Christopher Howe is Professor of Plant and Microbial Biochemistry at the University of Cambridge. His research interests include the biochemistry and molecular biology of photosynthetic organisms, and the evolutionary processes that gave rise to them. He has taught molecular biology for 20 years.

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Second Edition

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Preface to first edition

This book grew out of sets of lectures given to undergraduates taking courses in Biochemistry and Molecular Biology, and Medical Sciences. I hope it will be useful to people studying a range of biological subjects. I have tried to concentrate throughout on the general principles underlying the subject rather than to give overwhelmingly detailed accounts of vector systems and practical instructions. For those, there are more detailed books, reviews, catalogues, and lab manuals. I am grateful to the many friends and colleagues who have helped in the production of this book by reading sections (and in some cases the whole thing!) or in other ways. In particular, I should like to thank Janet Allen, Alison Baker, Adrian Barbrook, Alison Franklin, Hilary and Tony Larkum, and Saul Purton. I am also grateful to Robin Smith of Cambridge University Press for his advice and encouragement throughout the exercise, and to Robert Sugar and Dorothy Duncan of Bookworks for their help in the book's production.

Christopher Howe

Preface to second edition

The field of gene cloning and manipulation has changed dramatically since the first edition of this book appeared, and this development is reflected in the changes I have introduced in the second edition. The applications of PCR methods have expanded enormously, and “omics” and reverse genetic technologies are available across a wide range of organisms. Significant improvements have also been made in established areas, such as in the hosts and vectors for protein expression, and in the use of fluorescent proteins as reporter genes. As with the first edition, I have tried to stress the principles underlying the vectors we use, and avoid long and detailed lists (which would soon become out of date, anyway). Recognizing the necessity of being able to devise appropriate strategies for individual experimental situations, I have added a final chapter that gives examples and suggestions.

I am grateful to the members of my lab who waited patiently while the pressure of finishing this edition (which became known as my ‘big book of fun’!) delayed other things. I am particularly grateful to the people who helped directly in various ways, especially Mim Bower, Jon Burton, Ellen Nisbet, Saul Purton, Beatrix Schlarb-Ridley, and Petrus de Vries. I would also like to thank Katrina Halliday and Clare Georgy of Cambridge University Press, together with Peter Lewis and Rasika Mathur of Keyword Group for their technical expertise, patience and encouragement.

Christopher Howe