Preface

This book is mainly dealing with the basic science of gene manipulation. Indeed, gene manipulation brought a revolutionary change in the field of molecular biology.

The term gene manipulation can be applied to a variety of sophisticated in vivo genetics as well as in vitro techniques. In fact, in most Western countries there is a precise legal definition of gene manipulation as a result of government legislation to control it. In the UK, gene manipulation is defined as the formation of new combinations of heritable material by the insertion of nucleic acid molecules, produced by whatever means outside the cell, into any virus, bacterial plasmid or other vector system so as to allow their incorporation into a host organism in which they do not naturally occur but in which they are capable of continued propagation.

The initial impetus for gene manipulation in vitro came about in the early 1970s with the simultaneous development of techniques for: genetic transformation of Escherichia coli; cutting and joining DNA molecules; and monitoring the cutting and joining reactions.

DNA sequencing is a fundamental requirement for modern gene manipulation. Knowledge of the sequence of a DNA region may be an end in its own right, perhaps in understanding an inherited human disorder. More importantly sequence information is a prerequisite for planning any substantial manipulation of the

PNA; for example, a computer search of the sequence for all known restriction-endonuclease target sites will provide a complete and precise restriction map. Similarly, mutants are an essential prerequisite for any genetic study and never more so than in the study of gene structure and function relationships.

Major areas of this book are: *Gene Manipulation: An All-embracing Technique; Basic Techniques; Cutting and Joining DNA Molecules; Basic Biology of Plasmid and Phage Vectors; Cosmids, Phasmids and other Advanced Vectors; Cloning Strategies, and Sequencing and Mutagenesis.*