
Preface

Any relationship between this book and the previous edition is almost coincidental. During the past three years of writing, at times it has seemed that research might advance more rapidly than the results could be incorporated into the text. This has indeed been a period of such extraordinary progress that only a completely new book could do justice to the subject. This volume therefore shares with its predecessor only the same general aim: to provide a contemporary account of our knowledge of the organization and expression of eucaryotic genes. This book is, of course, the second part of the series *Gene Expression*, in which I hope eventually to provide a full and unifying account of the structure and function of the genetic apparatus of both procaryotes and eucaryotes, plasmids and viruses. The first and third volumes, *Procaryotic Genomes* and *Plasmids and Phages*, consider the fundamental processes of nucleic acid and protein synthesis and their control in bacteria, both uninfected and infected.

Eucaryotic Chromosomes is intended to delineate present knowledge of the structure of the chromosome and its constituent genetic units and to define the operations by which genes are expressed in the form of protein. The principal questions that are addressed remain the same as in the first edition of six years ago: what is the structure of the chromosome at the level of interaction between DNA and protein; how is chromosome behavior to be explained at the molecular level; why is there so much DNA and what is the nature of the genetic unit; how is expression of the gene controlled? But the answers are different. The discovery of the nucleosome as the basic subunit of chromatin should lead eventually to the definition of the ultrastructure of the chromosome itself in terms of macromolecular organization. The striking discovery that genes are not continuous sequences of DNA but have interrupted, mosaic structures leads to a new view of the nature of the genetic unit and the pathways for its expression. Together, these and other substantial advances that have been overshadowed only by this dramatic extension of horizons, have created a sense of momentum reminiscent of the now classical molecular biology of the sixties.

The rapidity of progress has left a pressing need for a comprehensive treatment to bring together these new views. In this book I hope to provide a critical assessment of the state of the art created by these advances. To define the limits of present knowledge I have in this book drawn on original data

as extensively as in previous volumes. Too often molecular biology is regarded as a didactic series of conclusions—in simple terms the story of how DNA makes RNA makes protein. But it seems impossible to show what weight is to be attached to conclusions without scrutiny of experimental data; and so I have tried to show sample data that are representative and may serve to indicate the general relationship between datum and conclusion. I believe it is the relative success of this attempt to provide a critical tour d'horizon that will mark whether this volume achieves what seems to have been the usefulness of previous volumes in providing a vantage point from which to assess future advances.

I have felt it more important than ever to maintain my usual policy of relying upon data of papers published in principal research journals rather than obscure symposia or other unreviewed series. In recent years this blight on science has grown to the point where particular information may appear in overlapping form in several places; except in very rare cases where these irregular volumes provide the only pertinent data, I have confined my attention to primary research communications. Even so, the attempt to provide access just to the mainstream of research has generated a very substantial list of references. Here it should be noted that to make these more useful, papers are cited in two ways: experiments revealing principles, breaking new ground, are quoted in some detail in the text and figures; supporting data are cited as additional references in the tables and footnotes. Indeed, this is a general policy, with the book written in a sense on two levels. The text and figures attempt to define supportable conclusions; but some of the more eclectic caveats, details of further systems, discussion of peripheral issues, and so on, are to be found in the tables and footnotes. In this way I hope that the book will be equally useful to the reader who wishes to obtain a critical overview and to the reader who needs to pursue a particular topic in more detail.

It is naturally a pleasure to thank colleagues too many to name individually for stimulating discussions and for providing access to unpublished data; in particular Dr. Howard Green commented upon several chapters. Finally it is a pleasure to acknowledge the support of my family through the elephantine gestation period, notably Ann for her belief that the book might indeed one day be completed.

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