

Preface

The impetus for this book is a course that I teach at UCLA – “Mechanisms of Eukaryotic Transcriptional Regulation”. While this course focuses on eukaryotic transcription, almost all of the students take it just after completing a course entitled “Mechanisms of Prokaryotic Transcriptional Regulation” taught by my colleague Jay Gralla. In Jay’s course, the students are introduced to a number of ideas in bacterial transcription that greatly aid an understanding of eukaryotic transcription. Thus, although this book focuses on eukaryotes, I have included key ideas and examples from bacterial transcription.

Like my course, this book is intended for both upper division undergraduates and graduate students in the molecular life sciences. It should also be useful to more senior scientists who find that their research has, either by accident or by design, entered the realm of transcription, and who therefore require a basic introduction to the field.

This book is by no means a comprehensive account of transcription, since a complete treatment of this large and rapidly expanding field would require multiple volumes. Instead, it discusses a few topics that are essential to an appreciation of the field and illustrates these topics with a number of carefully selected examples. These topics include the workings of the basal transcriptional machinery (Chapters 2 and 3), mechanisms of activation (Chapter 4), the role of chromatin in eukaryotic transcriptional control including mechanisms of epigenetic regulation (Chapters 5 and 6), and mechanisms of combinatorial control (Chapter 7).

While this book emphasizes unifying ideas, it is only through an appreciation of the details that underlie these ideas that one gains a deep understanding of them. Therefore, I have attempted to include enough examples to help readers feel at home with the concepts and the experimental basis behind them. My goal is to equip readers with the ability to approach the primary scientific literature with a critical mind.

While most of the conclusions presented in this book are broadly accepted, transcription is a rapidly evolving field being actively pursued in thousands of research labs around the world. In an effort to capture some of the current excitement in the field, I have chosen to cover certain topics that are not yet completely settled. Rather than attempting

to present all sides of every issue, I have, in some cases, chosen to take a particular stance that I believe is supported by the currently available evidence. Thus, some of the conclusions presented in this book will no doubt require future revision.

To increase accessibility, each chapter includes essential background information set off from the main text. These boxes introduce relevant experimental approaches (e.g., protein chromatography, the use of chemical probes, chromatin immunoprecipitation assays, genetic suppression) and relevant topics in biology and biochemistry (e.g., protein structure visualization, cooperativity, *Drosophila* segmentation). In addition, a few essential terms that are not defined in the main text are explained in the margins, and a comprehensive list of definitions is provided in the form of a glossary at the end of the book (terms highlighted in color in the text).

Since it is just as important to understand what we do not know as it is to understand what we do know, explicit discussions of some of the most important open questions is presented in side boxes. Furthermore, each chapter also includes a set of problems, many of which bring up complex unresolved issues and are intended to stimulate discussion. Possible answers to these problems are provided at the end of the book.

Finally, each chapter contains a list of suggested further reading grouped and ordered to relate to the way that the material is presented in the text. These are not meant to be comprehensive bibliographies, but instead include a few articles mainly from the primary research literature that have influenced my thinking and that have withstood the test of time. In generating these reading lists, I have left out many equally important and worthy papers, and for this, I apologize to my colleagues in the scientific community.

Albert Courey