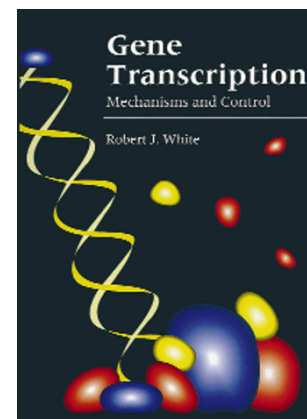


Unravelling transcription



Gene Transcription-Mechanisms and Control

by Robert J. White

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Eukaryotic transcription is a complicated business. The regulation of gene expression is fundamental to cell survival and its study forms the basis of numerous research programmes. Recent discoveries have once again highlighted the importance of transcriptional control in such diverse fields as developmental biology, cell signalling, cell-cycle control and cellular differentiation, among others. Specifically, significant progress has been made that links the modulation of chromatin structure to gene activation and repression. This includes the determination of the high resolution structure of the nucleosome core particle, and the discovery and characterisation of numerous transcriptional co-activators and repressors, which often themselves directly modify histones. Furthermore, the architecture of the RNA polymerases themselves has been elucidated as has the atomic structure of novel transcription factors. All of these discoveries, along with many others, have generated a vast amount of new knowledge, and along with it, a voluminous and often confusing literature.

Robert White's goal for this volume was to provide a general overview of the mechanisms and control of eukaryotic transcription both for the non-specialist and for researchers whose own interests impinge lightly on the field. For this remit, he is successful. He provides the scientific community with a well-written, thoroughly researched, and up-to-date book that covers most areas of relevant current research. The chapters are generally short enough for the uninitiated reader to get a taste for the subject without getting bored. Most of the text is written with the intention of providing a general survey of the various subjects although there is the occasional lapse into abuse detail.

Each chapter is followed by a list of selected references for further reading. This section is extremely useful, but it could have been improved by providing the reader with the reasons for inclusion. A few sentences describing the relevant breakthrough and what impact it had on the field would help

the reader select relevant citations and provide a contextual framework. Having said that, the lists are extremely useful as starting points.

White does an excellent job pointing out holes in the current knowledge base and raising important, unanswered questions; something that the uninitiated reader will appreciate immensely. Modern science is a jungle of technicalities and jargon, and the sheer volume of literature often makes it difficult to pinpoint important unresolved issues. White obviously has a good grasp of the major problems and issues facing today's researchers and is clear in his communication of this. Another added bonus is White's attempt, whenever possible, to link molecular mechanisms or explanations with relevant human diseases. He provides us with numerous examples of diseases caused by the aberrant regulation of transcription, and tells us just enough to whet our interest without wandering too far from the point under discussion.

Although the author does not always give us the relevant background as to why various experiments were done in any given organism, his choice of examples does give broad coverage of those systems that have been instrumental in moving the field forwards. The large emphasis on experiments performed in *Saccharomyces cerevisiae* probably reflects the fact that much of our understanding of eukaryotic transcription comes from this model organism, rather than being any particular bias of the author. A large proportion of the text is also dedicated to discussions of mammalian gene regulation and the general principles that have been elucidated from tissue culture and mouse models. White does a reasonable job at pointing out similarities between the lower and higher eukaryotic systems, but also makes sure to call attention to differences when they arise.

The general survey that White provides throughout most chapters is complemented by sections devoted solely to the RNA polymerases. Considerable attention is given to a detailed description of each polymerase and

its associated factors, the types of genes they transcribe, and if known, mechanisms of regulation. White manages to convey the key concepts of transcription by the three eukaryotic polymerases without discoursing at length on mechanistic details of the transcription process. This allows White to cover additional concepts such as transcription through nucleosomes and chromatin, and the regulation of transcription by the cell cycle. White does a fine job at comparing and contrasting the polymerases, and as a result the reader is left with a better understanding of the transcription machinery.

A major portion of the book is concerned with the proteins that regulate or target the basal transcription apparatus, the transcription factors. White introduces the reader to the major types of their structural motifs and to their roles in the transcription process. From zinc fingers to leucine zippers, sufficient detail is given for the reader to get an idea of how these motifs contribute to the function of transcription factor. The author makes a successful effort to describe the importance of modularity in transcription factor design. He describes the processes that have driven the evolution of transcription factors and how these have resulted in the reiterated use of a relatively small number of structural motifs for a broad range of functions. White finishes the book with a chapter attempting to describe the regulatory cascade of transcription factors acting during early *Drosophila* embryogenesis.

Gene Transcription-Mechanisms and Control is a successful attempt to collate material from a massive and rapidly expanding field. White manages to illustrate important ideas and concepts using examples from the recent literature, and in doing so brings these discoveries to a wider audience. □

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