of tumours. That immunosuppressed kidney allograft recipients have a greatly increased incidence of lymphoid tumours provides far from convincing evidence for the hypothesis, as the immunosuppressive drugs used could themselves be carcinogenic for lymphocytes or, alternatively, chronic stimulation by alloantigens might act as a trigger for malignancy in lymphoid tissues.

We must be grateful to Sir Macfarlane for giving us a highly readable and stimulating book, although the general reader should be warned that some background knowledge of immunology or genetics is desirable if he is to get the most out of it. □

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RNA polymerase

Walter F. Mangel

RNA Polymerase. Edited by R. Losick and M. Chamberlin. Pp. ix+899. (Cold Spring Harbor Laboratory: Cold Spring Harbor, New York, 1976.) $38.

GENE EXPRESSION and its control has, for the past 30 years, been one of the more fruitful areas of research for molecular biologists. The intriguing results of the bacterial geneticists enticed many biochemists and physicists to seek molecular explanations for such widely diverse phenomena as the inducible metabolism of sugars, the initiation of DNA synthesis and the temporal expression of bacteriophage genes. In most cases, they ended up studying transcription. This book summarises their progress and illustrates the multifarious and subtle ways that have evolved to control gene expression at the level of RNA polymerase activity. Now they are studying the primary sequence of *lac* operator DNA, the RNA primers for DNA replication and the phage-induced RNA polymerases.

Losick and Chamberlain are to be congratulated for having designed an excellent book which will be useful to those who desire a comprehensive introduction to the subject, as well as to those who are actively carrying out research in the field. It is also an excellent text for graduate students. The first half of the book contains an historical introduction by Weiss, an overview of the transcription process by Chamberlin, and eleven review articles that outline the active areas of research. The second half consists of 32 previously unpublished research articles. As with all Cold Spring Harbor monographs, this one contains an extensive and useful list of references.

In his introduction, Weiss describes how the discoveries of different but specific tRNAs and of nucleoside triphosphates as substrates for DNA synthesis led him to assay for an RNA polymerase activity in a crude rat liver homogenate. And in the next article, Chamberlin summarises the work done in the intervening 17 years. His overview of both the molecular and catalytic properties of RNA polymerase is comprehensive, integrating properties of the *Escherichia coli* enzyme with those from other prokaryotic and eukaryotic cells. This is followed by a highly practical article by Burgess on the purification and physical properties of the enzyme. Zillig, Palm and Heil discuss the functions and re-assembly of the subunits, and Krakow, Rhodes and Jovin describe the use of inhibitors to study catalytic mechanisms. The intriguing problems of how RNA polymerase recognises a promoter, initiates transcription and terminates RNA synthesis at specific sites, are discussed in articles by Chamberlin, Gilbert and Roberts. Scaife delineates the progress in the location of the genes for RNA polymerase and the control of their expression. Transcription patterns in bacteriophage infections are controlled, in some cases, by regulatory subunits or bacteriophage-induced RNA polymerases, as outlined by Losick and Bautz. Roeder discusses the properties of nuclear RNA polymerases and some of the problems encountered in studying eukaryotic transcription. Finally, Kornberg defines the role of RNA primers in DNA replication.

The research articles in the second half of the book are specific extensions of each of the areas described in the first half. There are three articles on promoter sequences. With nine promoters having been sequenced, common features, such as twofold axes of symmetry, are emerging. RNA polymerase will not, however, rebind to promoter fragments isolated by protection from DNase, so that additional elements remain to be discovered. The inhibitor, rifampicin, has been extremely useful in studying RNA chain initiation, and there are three articles which indicate that the mode of action of the drug is surprisingly complex. Rifampicin-resistant mutants made possible the mapping of the β subunit. In four articles, the locations of the other subunits are described and shown to be linked with the genes of some of the proteins of the translation apparatus. There are four papers on the regulatory subunits which become associated with RNA polymerase after bacteriophage infection. With the discovery that the rho gene maps at the suA locus, the termination step in RNA synthesis is a very active area of study and is represented by six papers.

Finally, there are some excellent articles on eukaryotic RNA polymerases from yeast, *Drosophila* and mammalian cells. Although the activity of RNA polymerase is modulated to control gene expression in prokaryotes, similar mechanisms have not yet been observed in eukaryotic cells. An elephant may still be a big *E. coli* but it is, ironically, less obvious when viewed at the level of transcription.

This is an excellent book on an important and fascinating subject. □

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Genetic evolution

Thomas H. Jukes

Molecular Evolution. Edited by Francisco J. Ayala. Pp. x+277. (Sinauer Associates: Sunderland, Massachusetts; Freeman: Reading, 1976.) Paperback £6.90.

THIS book is a compilation of thirteen papers that were presented at a symposium held at the University of California, Davis, in June, 1975. Most of the articles are more closely related to population genetics than to molecular evolution.

There is an introductory chapter by Francisco J. Ayala followed by chapters on genetic variation in natural populations (Robert K. Selander); genetic polymorphism and enzyme function (George B. Johnson); allozyme variation: its determinants in space and time (Michael Soulé); genetic strategies of adaptation (James W. Valentine); organismic and molecular aspects of species formation (Theodosius Dobzhansky); genetic differentiation during speciation (John C. Avise); biochemical consequences of speciation in plants (Leslie D. Gottlieb); protein sequences in phylogeny (Morris Goodman); molecular evolutionary clocks (Walter M. Fitch); evolution of genome size (Ralph Hinegardner); evolution of repetitive and non-repetitive DNA (Glenn A. Galau, M. E. Chamberlin, B. R. Hough, R. J. Britten and E. H. Davidson); and gene regulation in evolution (Allan C. Wilson).

The discussions of molecular matters occur principally in the final five chapters. Goodman's observations lead to his concluding that the evolution of globin sequences in vertebrates proceeds at different rates during different evolutionary periods. He attributes the "fast