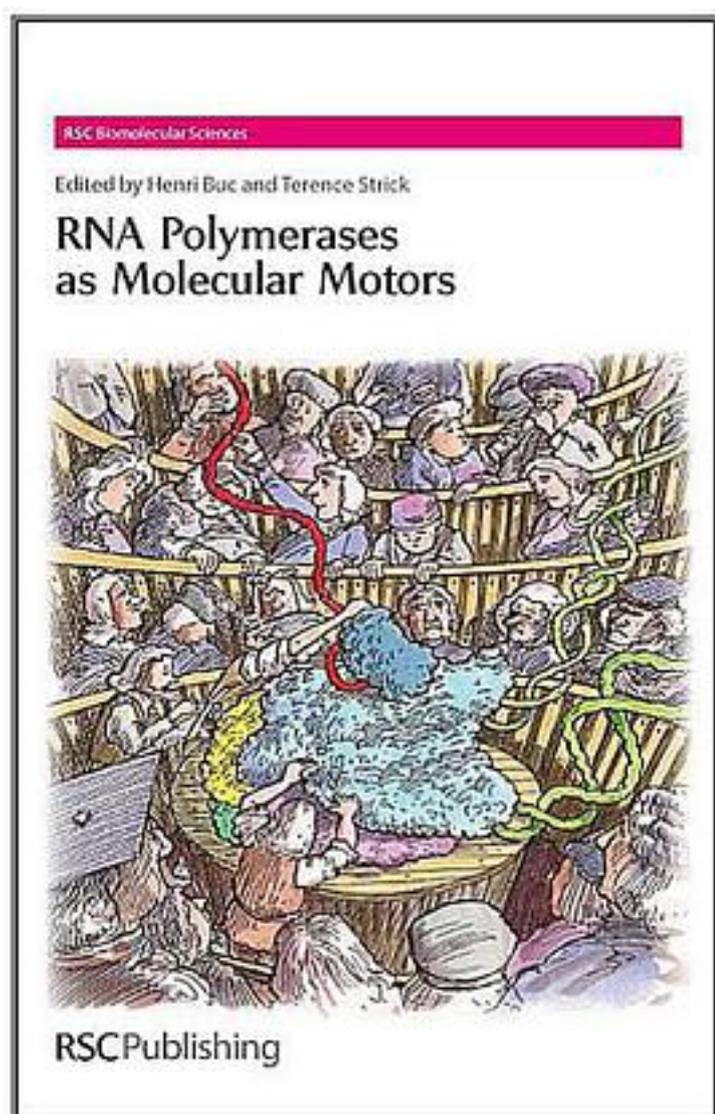


RNA Polymerases as Molecular Motors



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The cell can be viewed as a 'collection of protein machines' and understanding these molecular machines requires sophisticated cooperation between cell biologists, geneticists, enzymologists, crystallographers, chemists and physicists. To observe these machines in action, researchers have developed entirely new methodologies for the detection and the nanomanipulation of single molecules. This book, written by expert scientists in the field, analyses how these diverse fields of research interact on a specific example - RNA polymerase. The book concentrates on RNA polymerases because they play a central role among all the other machines operating in the cell and are the target of a wide range of regulatory mechanisms. They have also been the subject of spectacular advances in their structural understanding in recent years, as testified by the attribution of the Nobel prize in chemistry in 2006 to Roger Kornberg. The book focuses on two aspects of the transcription cycle that have been more intensively studied thanks to this increased scientific cooperation - the recognition of the promoter by the enzyme, and the achievement of consecutive translocation steps during elongation of the RNA product. Each of these two topics is introduced by an overview, and is then presented by worldwide experts in the field, taking the viewpoint of their speciality. The overview chapters focus on the mechanism-structure interface and the structure-machine interface while the individual chapters within each section concentrate more specifically on particular processes-kinetic analysis, single-molecule spectroscopy, and termination of transcription, amongst others. Specific attention has been paid to the newcomers in the field, with careful descriptions of new emerging techniques and the constitution of an atlas of three-dimensional pictures of the enzymes involved. For more than thirty years, the study of RNA polymerases has benefited from intense cooperation between the scientific partners involved in the various fields listed above. It is hoped that a collection of essays from outstanding scientists on this subject will catalyse the convergence of scientific efforts in this field, as well as contribute to better teaching at advanced levels in Universities.

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