
PREFACE

Many topics in the sciences go through cycles of waxing and waning interest, with the nucleolus being no exception. The nucleolus was initially described in the first half of the 19th century and attracted considerable attention by the early cytologists. However, after the turn of that century the subject was relatively dormant until the 1960s, when its function as the primary factory for ribosome biogenesis was established. During the 70s and 80s the steady research activities of a relatively small number of laboratories laid the foundation for the extraordinary progress of the 90s and the early 21st century. Because of the marked accumulation of knowledge in the past decade, it seemed appropriate to compile a volume that summarizes the status of the field as of the middle of 2003. This book attempts to accomplish that at a high level of detail. For readers who want to study the topic in greater depth, numerous references are provided in the individual chapters. Because of space limitations, not every aspect of the nucleolus is covered. I apologize to the many researchers who have made significant contributions to nucleolar research but whose work is not discussed in this book.

Over the past half-century, a few authors have assembled comprehensive volumes that covered the current understanding of the structure and function of nucleolus. The first of these was the classic volume by Busch and Smetana, (Busch H, Smetana, K. *The Nucleolus*. New York: Academic Press, 1970). Significantly, this book was published at the end of the decade in which it was established that the ribosomal RNA genes are located in the nucleolus organizer regions on chromosomes and that the nucleolus is the source of ribosomal RNA. In the next 10-15 years the field had matured to the point where much was learned about the locations and multiplicity of ribosomal RNA and protein genes, transcription and maturation of pre-rRNA, assembly of pre-ribosomal particles and regulation of ribosome biogenesis. Much of the information was collected by Jordan and Cullis from a symposium at the 200th meeting of the Society for Experimental Biology in 1980 in Oxford, UK, and compiled into a volume also entitled *The Nucleolus* (Jordan EG, Cullis CA. *The Nucleolus*. New York: Cambridge University Press, 1982). Even though it was published in 1985, the most recent comprehensive volume *The Nucleolus and Ribosome Biogenesis* (Hadjiolov AA. *The Nucleolus and Ribosome Biogenesis*. New York: Springer Verlag, 1985) remains an extremely useful source of information on this subject. With the rapid growth of new information, a few books have focused on specialized aspects of the nucleolus. A more recent book (Thiry M, Goessens G. *The Nucleolus during the Cell Cycle*. Austin: R.G. Landes Company, 1996) concentrates on the ultrastructural features of the nucleolus and also provides a concise historical timeline of discoveries concerning this sub-nuclear body.

Major advances in the area of rDNA transcription are found in a collection published in 1998 (Paule MR, ed., *Transcription of Ribosomal RNA Genes by Eukaryotic RNA Polymerase I*. Georgetown: R.G. Landes Company, 1998). Over the years, numerous reviews have provided timely coverage of progress in the field; most of these are cited in the chapters.

I was first exposed to the nucleolus when I joined the faculty at Baylor College of Medicine. Coming from a classical biochemistry background with research experience in protein chemistry, I barely knew the nucleolus existed. Fortunately, I was enlightened on the subject by Harris Busch and Karel Smetana, who had just finished writing their book on the nucleolus. They had accomplished the daunting task of assembling most of the accumulated knowledge on the subject and concentrating it into one location. Over the next few years, I slowly absorbed not only the science of the nucleolus, but also the culture and personalities surrounding it. This has been an interesting and rewarding journey; but more importantly, it has been a pleasure to see the nucleolus transformed from a mysterious black box into a ribosome assembly factory whose machinery has been inventoried and whose manufacturing processes are generally understood. I am also honored to have the opportunity to be the editor of the current book. Because I was pointed down this path by the pioneers in archiving nucleolar information, I dedicate this book to Harris Busch and Karel Smetana.

Mark O.J. Olson